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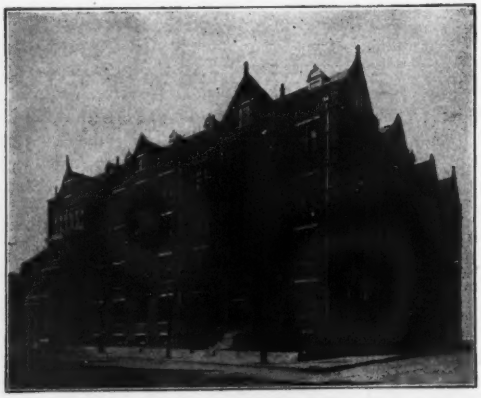

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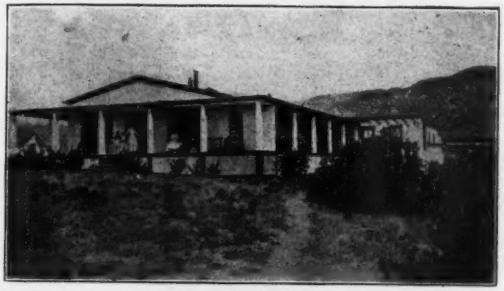

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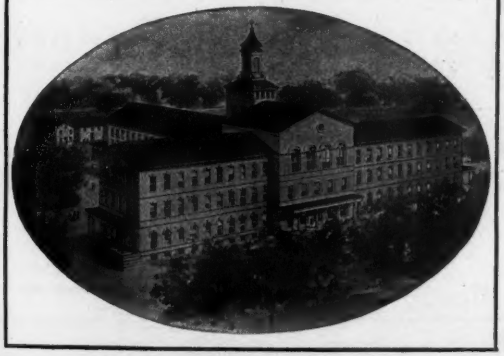

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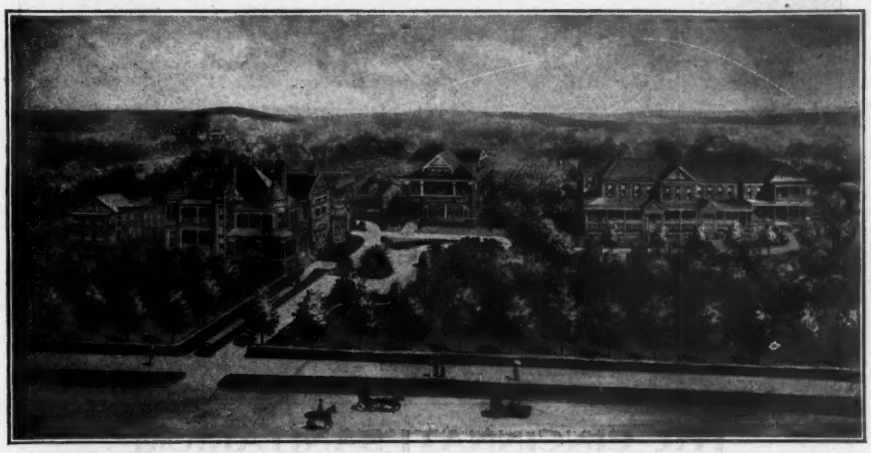

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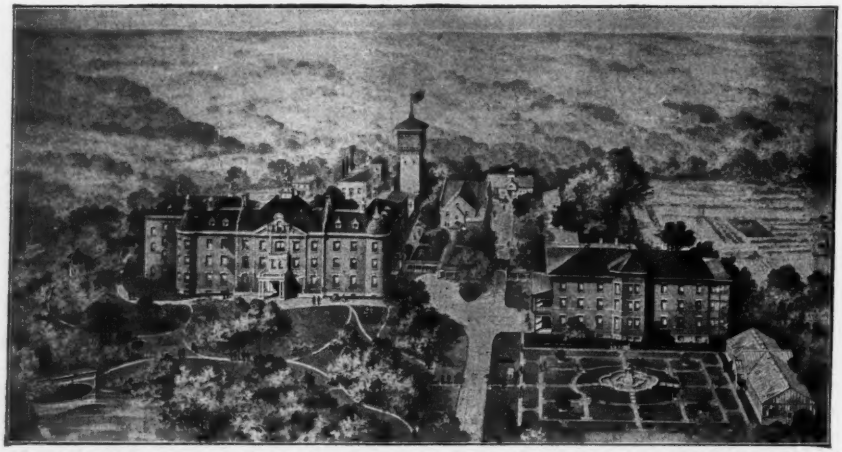

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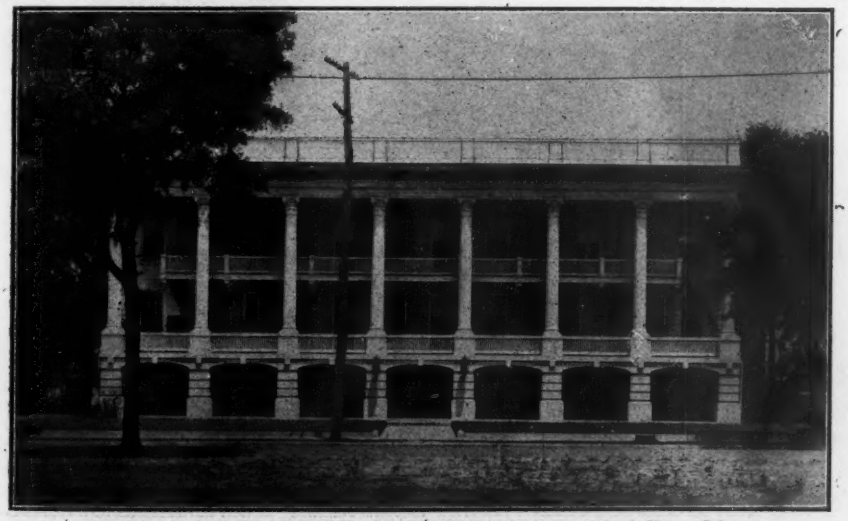

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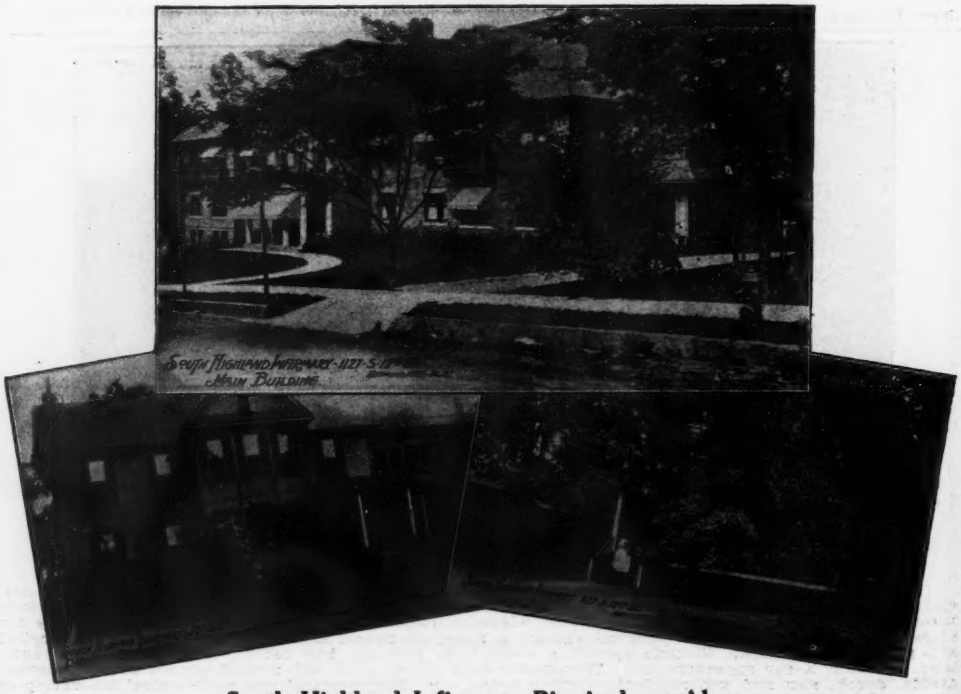

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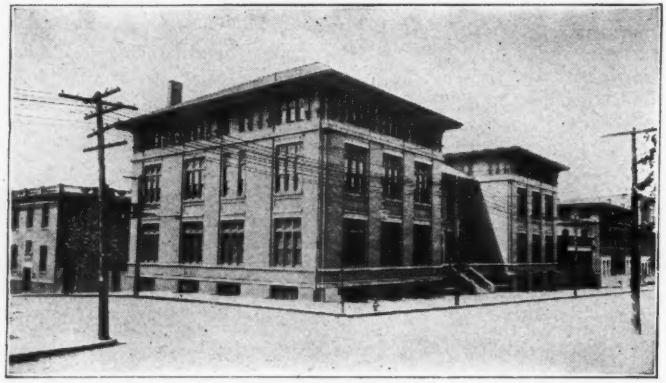

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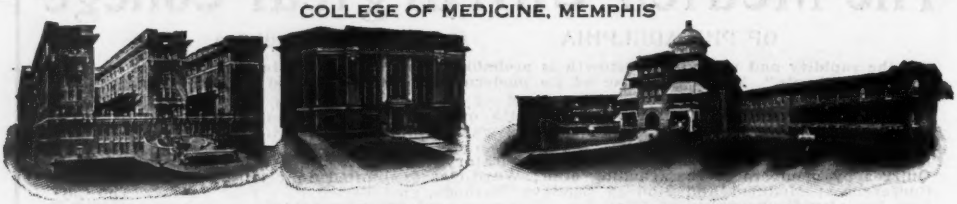

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The equipment of this department of Tulane represents the investment in a number of buildings erected for the purpose of medical education, and these include laboratories of chemistry, physics, pharmacy, pharmacology, physiology, anatomy, histology, botany, pathology and bacteriology, clinical medicine, surgery and, in addition, special laboratories of research, all of which total an amount which may be estimated at over a million and a half dollars.

Over 100 teachers contribute to the lectures and other periods of study so that every student who comes to the Tulane Medical Department receives the personal encouragement and interest of those who have his education in charge.

Nearly 5,000 graduates from this school have carried its teachings into practise among the people of the South chiefly, but as well to every part of the world.

With each advance in the requirements of medical education, the University of Louisiana has met all conditions, until today Tulane ranks in the first class of medical institutions of learning, with opportunities for clinical instruction which are unsurpassed in the United States and equaled in few other places.

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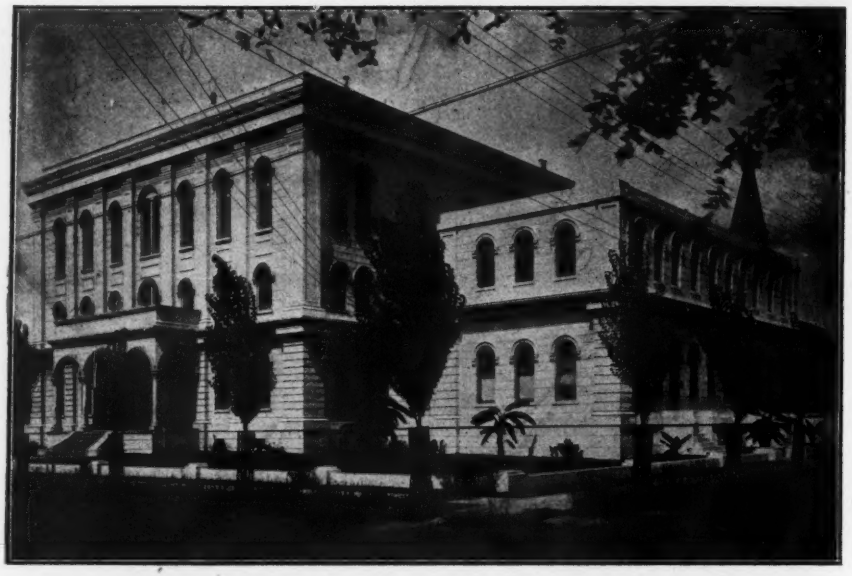

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Buildings, Laboratories, Etc.—The recent liberal appropriation by the General Assembly of the State of Alabama and by the Board of Trustees of the University of Alabama have enabled us to completely remodel the commodious college building and to build and equip new laboratories, giving us unsurpassed facilities for teaching all branches of medicine. The rooms and equipment for teaching anatomy are unusually fine. Laboratories for physiology and pharmacology are now under construction and will be completed and equipped before September.

Clinical Facilities—The surgical amphitheatre has been recently remodeled and other extensive improvements are now being made in the City Hospital; making it one of the largest and best equipped charitable hospitals in the South. The new College Dispensary, endowed by the City of Mobile, also provides a large amount of material for clinical instruction. The Mobile Infirmary, now under construction, has a surgical amphitheatre for classes from the college. The Faculty is also represented on the staffs of the Providence Infirmary, Southern Infirmary and Inge-Bondurant Sanatorium, where groups of students are taken for instruction. The Mt. Vernon Hospital, in Mobile County, having 650 insane patients, provides exceptional advantages in psychiatry and in general medicine.

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PUBLISHED MONTHLY

Volume V. NASHVILLE, TENN., SEPTEMBER, 1912 Number 8.

ORIGINAL ARTICLES

THE CINEMATOGRAPH AS AN AID TO MEDICAL EDUCATION AND RESEARCH.*

A LECTURE ILLUSTRATED BY MOVING PICTURES OF ULTRAMICROSCOPIC LIFE IN THE BLOOD AND TISSUES, AND OF SURGICAL OPERATIONS.

By RUDOLPH MATAS, M.D.,
New Orleans, La.

In selecting the cinematograph as an aid to medical education and research as the subject for this address, I have been prompted by several considerations, chief among which is the desire that this official duty, which devolves upon me as your presiding officer, shall not fall too heavily upon you in the midst of your arduous and exhausting labors.

In choosing this subject, I have been inspired by the example set by one of my distinguished predecessors who, four years ago, charmed and delighted us by a most entertaining and instructive exhibition of the artistic treasures which he had accumulated in the course of a lifetime, largely devoted to the cult of art as applied to medicine and surgery. This lecture he made most effective of the great masterpieces of the pictorial art, which had been inspired or produced by the medical men of all ages, either in elucidation of medical texts or of their procedures. After reviewing the modes of illustrating medical books, thoughts and methods—and exhibiting the results obtained by use of the pencil, the brush and the engraver's and etcher's tools—he laid stress upon the imperfections and poverty of medical illustrations which had characterized the production of medical books up to comparatively recent times. This crudity and glaring defect in the illustrator's art had been especially apparent in the medical bookmaking of this country, but we are now happy to testify that, thanks to Dr. Howard Kelly's great enterprise, devotion, and personal sacrifice and stimulating influence, in surrounding himself with the highest order of artistic talent available abroad, this reflection and this complaint are no longer justified; for America can now safely pride herself in the most perfect and creditable illustrations that adorn the pages of medical books the world over. In closing this worthy address, Dr. Kelly called attention to the important part that photography and stereophotography had come to play in recording surgical operations and especially in familiarizing the student with the technique of surgery as exhibited by the most approved specialists. We all appreciate the immense value of the personal work that he has since done in behalf of surgical education, in this direction, by the publication of his well-known *Stereoclinic*.

Without presuming to imitate Dr. Kelly, I have, however, sought in the same spirit, but with no claim to authority or special competence, to direct your attention and enlist your sympathetic interest—as teachers and skilled

*President's Address before the Southern Surgical and Gynecological Association.

technicians—in the value and availability of another method of photographic reproduction, which, I believe, far surpasses all others in inherent interest, educational value, and in its immense though undeveloped possibilities for the scientific and technical training of the men of our craft.

It is in this special sense that I now wish to speak to you of chronophotography—or what is more familiarly known as the moving picture process—and of the moving picture machines which, under various names, are in evidence all over the world. For the living or motion picture machine, whether it be called the "cinematograph" (Lumiere) (from *kinema*, movement—derived from *kinein*, to move), "kinetograph," "kinetoscope" (Edison), "photocinegraph," "heliocinegraph," "cinegraphoscope," "eventoscope," "kinebleposcope," "photopolygraph," "photocinematograph," "movementoscope," "badizoscope," "pentamimograph," "biograph," or by any other patented name attached to "graph" or "scope," and, added to classical and nondescript roots, is, in its fundamental principles, based upon the methods of chronophotography. It is always an instrument which analyzes motion by means of a series of instantaneous photographs taken at very short and equal intervals of time, capable in its perfected forms of recording with equal fidelity and distinctness the objects that are placed before it; reproducing the halting gait of an ataxic, hemiplegic, or paraplegic patient or the vibration of the wings of a fly, bee or wasp—which last scarcely 1-100 of a second (Lucien Bull)—or the flight of a modern military projectile which requires consecutive serial exposure varying from a 1-1000000 to 1-10000000 of a second, or the record of 500 consecutive pictures within 1-10 of a second. (Cranz, quoted by Gradenwitz, *Scientific American*, vol. ciii, p. 417.)

This is the machine which has become one of the most astounding and prodigious forces in the social organization of the twentieth century, in diffusing, imparting and disseminating knowledge, as well as in providing diversion, recreation, and amusement to the countless multitudes of the civilized world. Though originally devised by purely scientific men, for the accurate observation and recording of natural phenomena, chronophotography has been perfected and developed into most amazing effectiveness by inventors and physicists who, intent upon utilitarian and financial returns, have concentrated their efforts in perfecting the apparatus as a means of popular diversion. In this way great private concerns and companies have been organized all over the civilized world, whose chief if not sole aim has been to exploit this new photographic magic in every direction that might yield the largest pecuniary returns. The efforts of the earlier industrial pioneers met with an immediate response; success everywhere crowned their efforts, because everywhere we find men, hungry for the reproduction of lifelike scenes and stirring actions which arouse the emotions that lie awake or dormant in every human breast. In this way chronophotography has grown up in the course of a decade, from a mere rudimentary and shapeless idea, into a titanic Colossus which is now striving for power, as an indispensable world force, with the great world industries, even now scarcely second in importance to the great inventions like telegraphy, telephony, phonography and the printing press, with which it is so closely allied in the dissemination of human intelligence and in preserving with all their vividness and intensity the daily, nay, the hourly events of the world's history.

Without stepping beyond the boundaries of our own country, we learn (*Moving Picture World*, 1910, vol. vii, p. 183) that there were in 1910 about 10,000 or 12,000 moving picture theaters and other places of amusement which use the moving pictures, in the United States. The population of this country is about 90,000,000, and if you divide 90,000,000 by 10,000 we arrive at the deduction that there

is one moving picture house for every 9,000 of the population. Again we are told (*Moving Picture World*, 1910, vol. vi, p. 128) that twenty new productions go out every week to the 12,000 biograph theaters in the United States, spread over 1,500,000 feet of film, and that 5,000,000 of people are estimated to be in daily attendance at these picture shows.

E. Palmer Lewis, in the *Survey*, wrote two years ago, "In New York City alone there are some 350 motion picture theaters, with daily audiences of 1,000,000 or more, and a Sunday attendance of 500,000. Chicago entertains daily some 200,000 people in its 345 picture shows, and Philadelphia's 158 nickelodeons claim audiences of 150,000 every day of the week."

Replies to letters sent out by Lewis to the principal cities of the country, combined with statistics compiled by *Insurance Engineering* for April, show that in 158 leading cities of this country there were, in 1909, 1,987,000 moving picture exhibitions. A statement of the number who attended all these exhibitions would be a mere guess, but 4,000,000 a day is a conservative estimate, which would be far exceeded probably doubled by a calculation based upon the statistics of the present time.

Two-thirds of the entire theater-going public is entertained by this "infant industry" with its $50,000,000 of invested capital and its 190 miles of films daily thrown upon the screens of 7,000 nickelodeons—this in round, bare figures is the estimate of the new amusement that has sprung up within a decade and become popular only within four or five years."

What has been said of the moving picture movement in this country might be repeated, with even greater emphasis, of the progress of the moving picture in Great Britain and her colonial possessions and of all continental Europe, especially of France, Germany, Italy, Austria and Spain, as well as of other Mediterranean countries, peopled with an emotional and pleasure-loving population, who have greeted the advent of the moving picture show with eagerness and enthusiasm as an economic means of satisfying the imperative and universal craving for excitement and amusement.

But to furnish amusement and recreation is not the only feature of the cinematographic machine. The signs of the times all point to the belief that the great captains of this industry are beginning to realize that there are other equally profitable fields in which to invest the immense capital which this source of amusement alone has yielded. Suggestions are being offered and experiments are being tried of all kinds, proving that, in addition to an immense sphere of strictly scientific usefulness, the picture machine will ultimately revolutionize the present methods of general education and training in the technical and industrial, as well as in the public schools. It does not require a prophet's vision to see that in less than fifty years from now children in our schools will be taught history with moving pictures as a principal guide. The Champagne riots which recently made all France tremble were photographed by the motion picture camera. The riots, to become a matter of history, have been saved for the future by this means, and we have the true record of the events as they really took place. The same is true of the late pictorial record of the imposing coronation of the British sovereigns, and of the recent scrimmage of the insurgents and federals just across the Rio Grande in Mexico; of the Italo-Turkish conflict in Tripoli, and of the great revolution in the Celestial Empire, with its many battles, now laying the foundation for the Republic of China. These, and all historical events, are being portrayed with absolute fidelity on the spot, and will be accepted in future as the unchallenged witnesses, whose testimony must be the guide of future chroniclers and historians.

For geographical instruction, the cinematograph now sends its lines all over the earth. The eye of the camera makes pictures from Brazil to the Yukon, from China to the Cape, from the Cape to Cairo. "It has become the

teacher of the public mind, the organ of public opinion, the university of the common people."

In medical, surgical and natural science—anthropology, botany, entomology, natural history generally—the motion pictures present wonders and facts scarcely possible of realization; while its illustrations of industrial life, technical processes and mechanical devices, are unique in their thoroughness and definition.

As an agent in imparting sanitary and hygienic knowledge of great importance to the masses, the cinematograph is playing a most effective part. For instance, in impressing upon the public mind the dangers which lurk about the house fly as a transmitter of disease and of the importance of eradicating this pest, the moving picture is far superior to any lecturer's ability in its power to depict the peril.

"Pictures are made showing the fly invading a chunk of meat and laying its eggs. One sees these eggs hatching out and the maggots crawling over the meat. The maggots then bury themselves in the earth for a few days, and when they emerge they are still wingless, but on the eleventh day they are grown flies. One sees them feasting on dead fish; then fly from there to the sugar bowl and deposit some of the microorganisms they have collected. Then the fly rests on the edge of a cuspidor, and from there to an infant's nursing bottle, and, as the film is finished, we see the baby suckling at his bottle, the nipple of which is covered with germs, unless it has been previously sterilized." (*Moving Picture World,* 1910, vol. vi, p. 375.)

Colonial governments have long recognized its usefulness in bringing to the very doors of the people at home the importance, value and beauty of the British dependencies, not only as a means of inducing emigration, but of securing the introduction of fresh capital for further development, and it is fairly common knowledge that there is a constant movement in the direction of securing fresh pictorial demonstrations of future possibilities for immigrant and investor in such countries as Australia, New Zealand, Canada, British Columbia, Argentine, etc.

In religious, missionary, social and political work, the field of the cinematograph is equally great and important, both as a source of revenue and the conviction of usefulness and further effort instilled. For economical advertisement and public enlightenment it has no equal, and the benefit to manufacturers has been out of all proportion to the cost, illustrating the scientific, industrial and economical changes of the present day.

Various governments have already applied the kinematograph in naval and military affairs—gunnery, target practice, fleet movements, maneuvers—and before long every regiment and every warship will be equipped with a kinematograph for the acquisition and instructive display of pictures; indeed, to form a systematic course of education in training establishments afloat and ashore. (*Clegg, Moving Picture World,* 1910, vol. vi, p. 331.)

In the preceding remarks only brief mention has been made of the services accorded by the cinematograph to medicine and surgery, and it is this particular field of application that I now wish to consider more attentively.

While it is true that the cinematograph had its earliest beginnings in the minds of physicists such as Plateau (1829), Colman Sellers, Reville, du Hauron, and the astronomer Janssen, who in 1875 devised an astronomical revolver to show successive pictures of the planet Venus near the limb of the sun at her transit, we must not forget that among the greatest and most fundamental contributions to the science and methods of chronophotography were those made in the study of physiologic problems by Jules Etienne Marey, the eminent and indefatigable French physiologist. He devised a delicate photographic gun, which he utilized especially in the study of the flight of birds and in all the forms of locomotion,

aquatic, aerial and terrestrial as exhibited by various animals and by man, and by his pupil Demeny, who invented the photoscope for the special purpose of reproducing the motions of the lips and so successfully that deaf mutes were able to read the photographic sentences. As an instance of Marey's application of the cinematograph to physiological problems, in demonstrating muscular motions of the heart as an organ of the circulation (J. E. Marey, "The History of Chronophotography"; Smithsonian Reports, 1901, Washington, D. C.), we quote: "The heart of an animal laid bare and brilliantly illuminated gives on the moving film the succession of systole and diastole of its auricles and ventricles. The motion of the eyes themselves were also shown at the Marey Institute by his pupil Orchansky. He has photographed the dotted trajectory of the eyes in reading and in this motion has been able to distinguish the components, due respectively to the ocular muscles and to the displacements of the head."

Even before Marey had begun his first researches on the flight of birds he had been preceded by the distinguished American investigator, Muybridge, a photographer of Sacramento, who in 1878 began his now famous studies on the motion of horses and other quadrupeds and man which formed the basis of his monumental work on "The Human Figure in Motion," published in 1901 under the auspices of the University of Pennsylvania. As told in this great work, Muybridge, as the result of numberless experiments, in which he displayed an unequalled capacity for taking infinite pains in the pursuit of an idea, finally devised his "zoopraxiscope," a machine based upon the principles laid down by the Belgian physicist Plateau in the early part of the last century, for the purpose of demonstrating the persistence of retinal impressions. Photographic analyses of changes incidental to motion of any kind commenced with this investigation, and the zoopraxiscope was the first instrument ever constructed or devised for demonstrating by synthetical reconstruction, movements originally photographed from life, and for many years it was the only apparatus applicable to this purpose.

It was not until 1893, or more than thirteen years after it was first used, that any improvement in its construction, or in its effects on the screen, were made public.

The improvements in the modern instrument are due to the invention of celluloid films substituted for the glass plates in receiving and exhibiting the photographic images.

In 1878, Muybridge published under the general title, "The Horse in Motion," the results of his labors. This was followed in 1881 by a quarto volume of some 200 pages of photographs illustrating various movements of horses, dogs, and other animals; also feats of the gymnasium and the field by some California athletes. This encouraged a more comprehensive investigation. The funds were lacking, however, until the cooperation of the University of Pennsylvania was secured through Dr. William Pepper. The work was commenced in 1884 and completed in the autumn of 1885.

The results of this investigation, consisting of 781 mezzo-tint engravings with examples of more than 20,000 acts of motion of animals, birds and human beings, were in 1887 published in eleven folio volumes, under the title of "Animal Locomotion."

The author's edition of this volume is valued at $2,500. Muybridge used upward of 500,000 plates in his experiments. Wet plates were used and exposures of 1-5000 of a second made. The odd pictures obtained were projected at a rate varying from 12 to 22 per second, by means of the zoopraxiscope.

This colossal work is an imperishable contribution of chronophotography as applied to physical and physiological problems in locomotion, by an American genius.

The subsequent discoveries of Marey and his pupils, Lucien Bull and Demeny; of Auschutz, in Germany; of Augustus Le Prince, Jenkins, Costler, H. R. Heyl,—all inventive Americans; of Levison, and especially the Lu-

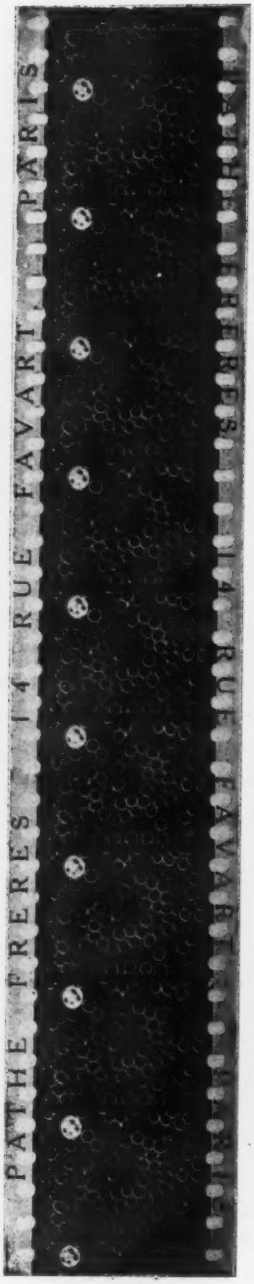

FIG. 1.—Human blood in motion.

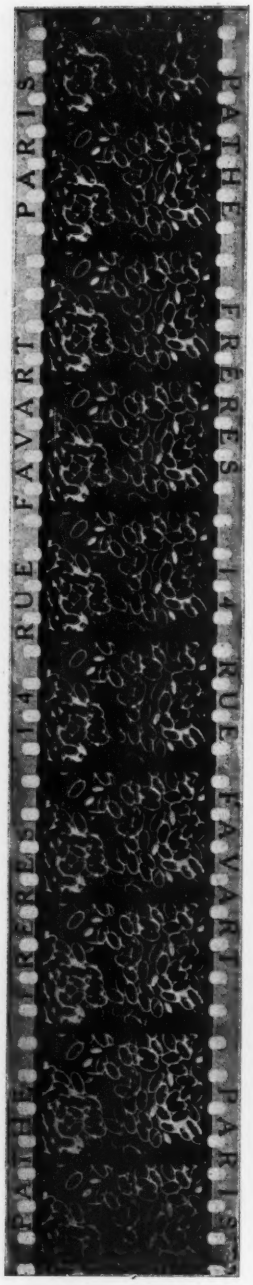

FIG. 2.—Blood of Oviparous animals.

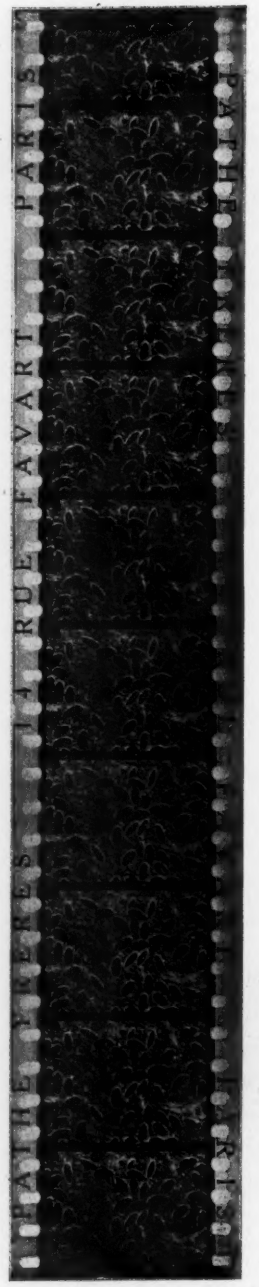

FIG. 3.—Hemokonia, or blood dust (emulsified fat in the circulation).

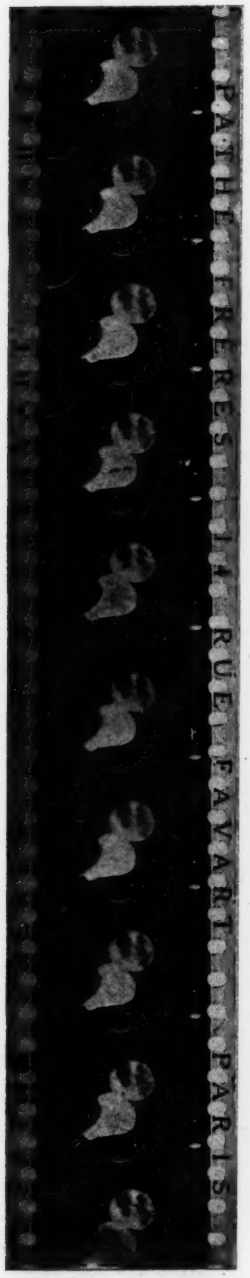

FIG. 4.—Ameboid movements of a leukocyte (blood of a salamander).

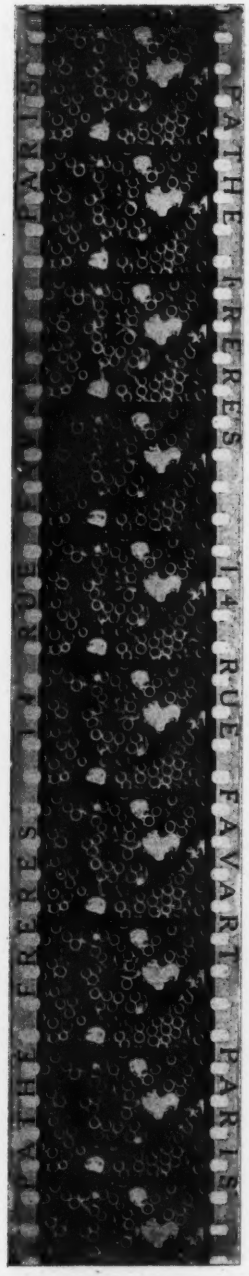

FIG. 5.—Trypanosoma Lewisi. The blood of a sewer rat infested with these parasites.

FIG. 6.—Trypanosoma Brucei, the cause of the nagana disease in South Africa.

miere brothers; of Thos. A. Edison; of Cranz, and, very recently, of Comandon, assisted by the Pathe brothers—and of many others too numerous to recall—have culminated in the present most effective machine and its prodigious capacity for taking distinct instantaneous pictures in *incredibly short exposures.*

Among the medical men who deserve a conspicuous place in the history of the moving picture in its application to the study of disease is Dr. Walter G. Chase, of Boston, Mass., whose pioneer efforts in this direction are recorded in a lecture delivered before the Boston Medical Library Association, November 15, 1905, and published in the *Boston Medical and Surgical Journal,* November 23, 1905. Interested in the study of pathological motion he availed himself of the services of the American Mutoscope & Biograph Company in analyzing the convulsive phenomena of the epileptic seizure. This is a difficult problem for the reason that it takes several minutes to set up and focus a biographic camera and the patient is not always sufficiently obliging to have his seizure out of doors in an available place and also at a time when the sun is at its best, for an outdoor light picture or a room with powerful electric lights especially arranged for the purpose. The only place available for this purpose is an epileptic colony, and in this he was fortunate in the cooperation of Dr. Spratling and his assistants at the Craig Colony for Epileptics. The method by which he obtained his pictures is interesting. "Realizing that it was impossible to set up a camera after the seizure had commenced he had some 125 male patients from the infirmary assembled at a convenient spot out of doors on a warm summer day. The clothes were removed and the patients covered with blankets, so that, a seizure occurring, the blanket could be readily dropped, and the subject within a very few seconds placed in the range of the camera. The results obtained as shown by the prints which accompany Dr. Chase's paper show that his painstaking efforts were eminently successful in "biographing" twenty-one separate seizures, including one patient in the status epilepticus, all of which are shown with remarkable accuracy and vividness in the prints which accompany Dr. Chase's paper.

In the case of status epilepticus, 200 feet of film were used, covering a total of 3,200 pictures for this single case, which were obtained at the rate of sixteen exposures to every foot of film. He has biographed in a similar way the movements of the eyes in nystagmus and groups of rhythmic idiots, each with his individual motion keeping time with music. I agree with the editor of the *Boston Medical and Surgical Journal* in the belief that few physicians could see such a series of epileptic and other neuropathologic moving pictures as Dr. Chase has been able to reproduce, without learning something of the disease which neither his previous observations or his study of text-books have taught him.

"The more usual diseases of the nervous system also are still comparatively little known to the general practitioner of medicine and particularly the medical student or recent graduate. These may, and no doubt in the future will, be reproduced by the biograph in such a way that once seen by the student they will leave an impression hard to eradicate. In this respect Dr. Chase's admirable labors have already anticipated our own firm convictions that the universal adoption of cinematographic pictures as a means of instruction will mark a step far in advance of any yet taken in the application of photography to medicine. There can be no question that the hour is ripe for this innovation and that the immediate future will see its general introduction into our medical schools."

The moving picture machine has also been applied in France and Germany to analyze the gait of ataxic, paraplegic or hemiplegic, and other pathologic types of locomotion. Paul Sainton has also recently (*Soc. Neurol. Paris,* May, 1909) especially and profitably studied the convulsive tics, with moving pictures.

We have already referred to Bull's invention of the ultra-rapid cinematograph, by means of which sharp stereoscopic cinematographic views of the flight of a fly or the breaking of a soap bubble are readily obtained.

With the ordinary cinematograph the photographic film moves discontinuously, being arrested at the moment of each exposure. While this is simple enough at moderate speeds, it would be quite impossible when the exposures are made at the rate of 2,000 a second, and the mean speed of the film 400 cms. a second. These are the figures that are necessary for the study of insect flight, and these are attained by the new instrument. With such a speed, the movement of the film must be continuous and a sharp image is possible only if the exposure does not exceed 1-400000 of a second, and for this the electric spark gives a light of sufficiently short duration. In order to study the movement represented on the films, it is merely necessary to pass them through the ordinary kinematograph, making some fifteen exposures a second instead of the 1,500 or 2,000 a second employed in the taking of the photograph, and then the movements one hundred or more times as slow, will be seen, and, in many cases, easily followed.

By means of this very ingenious device, Bull has obtained admirable motion pictures of the flights of insects of all kinds, and has established thereby important biologic laws.

It is the same rapid spark device which has permitted Cranz and others to study the mechanism of the flight of projectiles, the working of self-loading arms, the effects of explosives of modern infantry high velocity projectiles in moist clay and in vessels filled with water; the crushing of bones; the explosive effects of such bullets on the skull, etc. All these different phenomena when reproduced on the projection screen seem to occur very slowly and accordingly can be analyzed in all their details.

Turning our attention to other fields, we find that Prof. Braus, Heidelberg, 1911, has demonstrated that the completely isolated embryonic turtle heart continues to beat alone, and to grow well. I have already referred to Marey's movements. Going a step farther, P. H. Eijkman, a Dutch investigator, by combining the Roentgen ray and the cinematograph, has obtained remarkable pictures of the heart in motion. Kaestle and Rieder, cooperating with the engineer Rosenthal, have been able to follow the movements of the stomach in digestion. They call this novel branch of chronophotography, "Biorontgenography." Working on the same lines, we find that J. Carvallo, one of the investigators attached to the Marey Institute, at Paris, recently succeeded (1910) in illustrating by cinematographic X-ray pictures the process of digestion in warm and cold-blooded animals. The animals under test were fed with a bismuth meal. Experimenting with the frog, the digestive tube of this batrachian was isolated and photographed with the cinematographic apparatus. A series of motion pictures were also taken through the fluoroscopic screen, and the two series, the simple and the x-ray image, were compared. It was found that both series corresponded. The external peristaltic movements caused by the progress of the bismuth bolus, agreeing with the radiographic view of the bolus as seen through the screen in the lumen of the bowel.

In this way, Carvallo's x-ray cinematographic pictures have succeeded in affording a reliable reproduction of the digestive process in the different species of animals placed under observation.

But undoubtedly the greatest triumph that has marked the recent advances of the new science of radiocinematography has been obtained by Comandon and Lomon, of Paris, who have succeeded in projecting and making perfectly practical the permanent *moving* reproduction of intensified fluoroscopic images of the skeleton and other organs of living animals, which thus far have been available only by ocular inspection or by single plate expos-

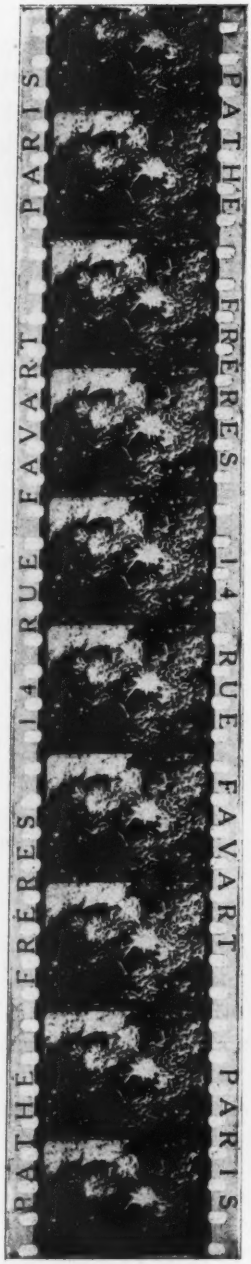

FIG. 7.—Agglutination of the Spirochæta gallinarum, analogous to the Widal reaction in typhoid fever.

FIG. 8. — Spirochæta Obermeierei in the blood of patient suffering with recurrent fever.

FIG. 9.—Spirochæta or Treponema pallida, the parasite of syphilis.

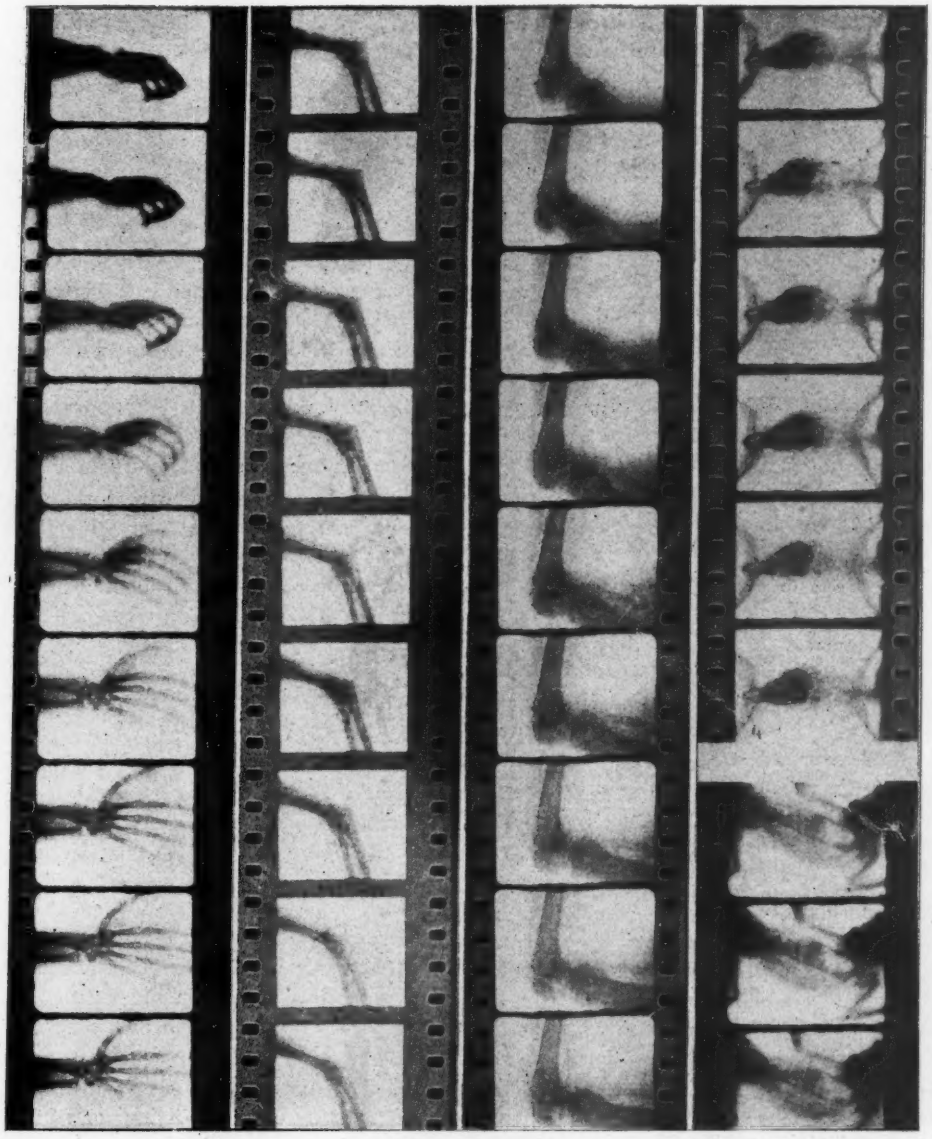

FIG. 1—Extension of the fingers combined with supination of the forearm (two images per second).
FIG. 2—Extension of the elbow (two images per second).
FIG. 3—Flexion of the knee-joint (two images per second).
FIG. 4—Thorax and abdomen of a guinea-pig. The intestine filled with Bismuth paste is shown in active peristalsis with the bismuth bolus traveling rapidly along the intestinal canal (twelve images per second).

urers. As described in their epochal paper in the *Presse Medicale;* May 27, 1911, No. 42, the results obtained by them with their earlier apparatus were first exhibited before the Society of Radiology of Paris last April. There was no difficulty in demonstrating the motion exhibited by such small animals as frogs, birds and rats in their entirety. Their radiography is obtained with a rapidity of fourteen images per second. With exposures of twelve images per second the cinematograph picture of the guinea-pig is obtained.

The skeleton of the entire animal is exhibited in all its moving details, even to such small items as the movements of the patella over the knee-joint. The thoracic cage moves hurriedly or slowly with the respiration. The heart distinctly pulsates in perfect outline. The liver is seen moving up and down with the diaphragm and is shown very clearly above the intestinal mass which is impregnated with the bismuth. The rectum is seen filling with the bismuth paste and then emptying itself of its contents.

In the monkey, the inner visceral life, which is invisible to our eyes by its impermeable integument, is revealed in a striking manner. Here the respiration, rhythmical and slow, as well as the movements of the heart, may be readily followed. The stomach is well outlined and even the spleen is visible.

In studying the extremities, the flexion and extension as seen in profile, reveal in an astounding manner the mechanism of the condyles on the tibial planes. The movements of pronation and supination in the forearm and the flexion and extension of the wrist-joint may be studied in every detail and in a realistic manner. This is a revelation to the observer who is only acquainted with the isolated and plain image. These marvelous researches as stated by Comandon and Lomon, are barely crossing the threshold of practical application. The recent field of physiologic and anatomopathologic application is only beginning to unfold itself. It is in this sphere that lie some of the greatest unexplored possibilities for the perfected radiocinematograph and it is in this direction that further advances must soon be made.

"We are still in need of greater intensity of illumination for the reproduction of rapid phenomena; we are in need of screens that will give better definition; of tubes that will be more resistant, and of still more sensitive photographic emulsions.

"The day will soon come when these desiderata will be at hand and it will be possible to produce the mechanism of a dislocation or a fracture produced experimentally. As the matter now stands, the progress accomplished in the last twelve months in the graphic reproduction of mobile radioscopic phenomena is simply prodigious."

But the wonders of this new world of light and motion will not cease, and I still have another and more extraordinary achievement of the moving picture to submit, which you will admit is destined to prove of incalculable value in the teaching of miscrscopic pathology and especially in that ever-growing science of hematology and hematic parasitology.

Marey, ever alert for new applications of the graphic method in every department of medical science, had, in 1899, adapted the moving picture machine to a study of motions which take place in the field of the microscope; but it was reserved for the genius and enterprise of J. Comandon, then a young medical student attached to the laboratory of Prof. Dastre, of the Sorbonne, to advance a step farther and to utilize, in the most practical fashion, the cinematograph in the newly discovered field of ultramicroscopy.

All those who have worked with reflecting condensers for observing living bacteria under a dark background illumination, know how strikingly impressive are many of the preparations studied in this light. No doubt many observers have regretted that they could not preserve these images, not only because of their almost fantastic and living beauty, but

also for their great scientific interest. It was this thought that first led M. Comandon to photograph the ultramicroscopic forms that were the objects of his observation. But the ordinary instantaneous pictures failed to reproduce the *life* that was exhibited to the eyes of the observer, and more often the images were blurred by the constant motion of the microorganisms which displaced themselves from the focus. This prompted him to follow in the footsteps of one of his collaborators and teachers, M. Victor Henri, who, in 1908, had already attempted to apply the cinematograph to the study of Brownian movements. Finding the appliances thus far devised for this purpose absolutely unsatisfactory, he obtained the assistance and cooperation of M. Chas. Pathe, of Pathe freres, who placed at his disposal the vast mechanical and scientific resources of his great establishment. By utilizing the parabolic condenser of Liedentopf, constructed by Zeiss, illuminating the field with a powerful 30 ampere arc light (or the sunlight reflected by a heliostat) and adapting the cinematographic camera to a prolongation of the microscope, he was able to reproduce all the images visible in the dark field with a medium amplification. The views thus obtained, as projected on the screen, appear quite large; the human red cells being magnified so that they measure 15.3 cm. in diameter without being blurred, a result which equals an amplification of over 20,000 to 30,000 diameters. The images are reproduced by the cinematograph at the ordinary rate of sixteen pictures per second, which is equivalent to an exposure of 1-32 of a second for each image. Projected on the screen at the same speed, these images reproduce the real aspect of the preparations. In this way are seen with all their living qualities, the movements of the various elements of the blood, the different parasites which infest it, and their Brownian movements as observed in particles of less than 1 micron in diameter.

These moving films are, therefore, permanent documents which faithfully reproduce the scenes of ultramicroscopic life and are, in their very nature, as *living* phenomena, not, like dead, fixed and stained preparations, extremely changeable and of short duration. By analyzing each one of the images thus obtained, the movements of the microorganisms may be decomposed and reduced to their primitive elements, just as Marey successfully analyzed the step of man and the flight of birds.

These views also allow an accurate count of many formed elements which it would be impossible to numerate owing to their motility. For example, the little movable particles of the blood which Hayem and Ranvier had studied long ago, and which were subsequently named "hemokonies," or hemokonia (blood dust) by Muller, have been recently studied with great care by Alfred Neumann of Vienna, who has ascertained that they are simply minute fat particles. Their appearance in the blood is proportional to the amount of fat ingested and emulsified in the alimentary canal. Neumann was not able to count them accurately because of their very active Brownian movements. Comandon, with his cinematographic films, experienced no difficulty, and thus obtained numerical tables and charts which clearly demonstrated their direct relation to the amount of fat ingested by the subject under observation. The hemokonic count, thanks to the cinematograph, may now be made available as an index of fat absorption.

In addition, Comandon has been able to study, by this method, a phenomenon which he first discovered and described as an "electric transport of microorganisms and living particles." He found that if an electric current is made to cross the field of observation, certain elements of the blood are attracted and drawn to the anode and others to the cathode, thus grouping the various elements into electro-negative and electro-positive classes. Thus, the red cells are always attracted by the anode and the trypanosomes by the cathode. The typhoid bacillus moves toward the cathode;

some of the colon bacilli move toward the anode. It does not matter how the organisms may be grouped or mixed on the slide, they will always preserve their special or specific affinities. Some microorganisms appear to hesitate and refuse to travel to either pole and become possessed of disorderly movements which last as long as the current is transmitted through the medium in which they live.

Thus we conclude that through M. Comandon's beautiful researches we are not only able to penetrate into the intimate life of the living blood and its parasitic inhabitants, but also to study the processes of reaction and defense (inflammation, migration, diapedesis, phagocytosis, etc.) as they are exhibited in the blood vessels and in the peri-vascular tissues.

In this way, the cinematograph is unrivalled for permanent record and observation, as well as for the most impressive instruction to students in general and surgical pathology, etc. Comandon has, furthermore, added another original observation which may prove of decided utility in identifying some cells and organisms by their electric attraction and repulsion.

In the views that will be successively projected on the screen you will see the coagulation of the blood, the blood of man, of the birds; the hemokonia or fat bodies of Muller; the ameboid movements of the leukocytes; phagocytosis, as this occurs in anthrax; you will see the flora and fauna of the intestines of the mouse; the Trypanosoma Lewisi in the blood of a sewer rat; the Trypanosoma Brucei as transmitted by the tsetse-fly; the spirilla of relapsing fever (Obermeierei); the spirochete of Vincent; the Treponema pallida as it lives in syphilitic lesions; the agglutination of the bacillus of Eberth, as seen in the Widal test, and, finally, the demonstration of the Erlich-Hata "606" as it affects the parasites in an experimental lesion in the cornea of a rabbit.

These films have been selected chiefly in view of demonstrating the value of cinematography in teaching ultra-microscopic pathology in the class-room. Here you will see the *life* that no other form of photographic process could reproduce.

"To see the microorganisms move, evolve and revolve in the midst of normal cells, the spirochetae uncoil and undulate in the fluids which they inhabit, to see them hide behind the blood corpuscles, or in clumps of fibrin, turn, twist and rotate inside of a red corpuscle as if in a cage—to see them apparently screw into each other as in a strange conjugation; to see trypanosomes moving back and forth in every direction, displaying their delicate undulating membrane, shoving aside the blood cells that are in their way, while by their side the leukocytes lazily extend or retract their protoplasmic pseudopods—is to realize that we are in the presence of an unknown world, a world of the infinitesimally small, but a world as real and as complex as that which is visible to our eyes."

But dismissing these more scientific applications of the cinematograph as they especially concern the laboratory teacher, let us consider for a few moments examples of its application as an educational agent in the proper training of the mechanic and artisan in the trades which require intelligence and manual dexterity, and which hint at its possibilities in the teaching of surgical operations and the proper handling of surgical tools.

A writer in the *Scientific American* (supplement, 1909, vol. lxvii, p. 79) states: "The moving picture machine offers a partial solution of the problem of imparting individual instruction in the trades. Next to actually doing the thing, or seeing a skilled workman do it, is the seeing it done in a series of moving pictures.

"For example, take the operation of accurately fitting a flat surface on a piece of cast iron held in a vise; a series of pictures showing the correct position and manner of handling the file could not help making a strong impression on earnest learners of the machinists' trade. The same method would apply

to the operation of chipping with the hammer and chisel, scraping, lapping, laying out and many other hand operations, almost impossible of complete description without working examples.

"In machine work the moving picture scheme could be employed with even greater success. The operation of chinking a casting on the face plate of a lathe, and bowing and facing, could be shown vividly. Dozens of other operations shown in this way could be repeated indefinitely for the instruction of countless numbers of young men. They would be impressed by the methods illustrated and the spirit in which a skilled workman proceeds in doing the things portrayed."

The first investment for films illustrating shop operations would be heavy and the plan must be worked out cooperatively in order that manufacturers may avail themselves of this system of imparting apprenticeship instruction cheaply.

In our opinion there is much in this idea as a feature in a general scheme of industrial education.

From this brief statement of the application of the cinematograph to the manual training of the artisan, we gather not only a valuable example but also suggestion, which I hope will not fall on sterile soil in a gathering of surgical specialists who are preeminently recognized as the foremost in availing themselves of every opportunity to improve the technical efficiency of their profession.

Here we see formulated a plan by which any mechanical trade requiring manual training and skill in its exercise, is to be taught by the living vitalized image of the expert and master mechanic at work. Not only is the student able to see the work done in every minute detail, but he will also see the performance carried out as it should be and is done by a chosen expert in that particular procedure or maneuver.

Why could we not profit by this suggestion and inaugurate cinematographic courses that would illustrate all the operations of surgery covering a complete course of operative surgery as contributed by the most noted and greatest specialists in the surgical profession? Dr. Kelly has not only grasped this idea, but has put it into execution in his admirable stereoclinics, but, I dare say, he would be the first to admit that, notwithstanding the recognized value of the stereoscopic photograph, this has its decided limitations, as it can only be seen and studied by the individual who is holding the image before him and that it is not applicable to class demonstrations where groups of students may simultaneously witness an operation with all the vividness and intense realism of the moving picture. Furthermore, the moving picture not only shows every detail that the small stereopticon can reveal, but it follows every movement and expression of the operator, his assistants, and the patient as they are projected, magnified to normal size, on the screen. Who could gainsay the enormous advantage to the medical students of this country if they could be given the privilege of witnessing, in their own lecture rooms, the scenes and accomplishments which are enacted by the great masters of American surgery in Rochester, Baltimore, Chicago, Boston, New York and Philadelphia, and other places; to see each and every one of the classical operations of surgery performed by a recognized authority in that particular operation?

It is to the credit of Dr. E. Doyen, of Paris, that he has not only organized this method of observation and instruction over fifteen years ago, but that he has devised special ingenious machines by which accurate and artistic reproductions of all the operations performed in his institute in the rue Picini could be permanently preserved. He has utilized his vast collection at great cost not only in illustrating his remarkable treatise on surgery ("Therapeutique Chirurgicale," in six volumes, 8vo. Maloine, Paris), but is publishing a special course of operative surgery as a text to accom-

pany a corresponding series of cinematographic films which are now issued by the Eclipse Company, of Paris. It is his intention to utilize not only monotints, but to reproduce his operations in colors, much in the same manner and by a similar process as that adopted by his color photographer, the well-known M. Courtellemont, in his excellent polychrome plates which are now appearing serially in the Annales de Doyen.

Merely to show what has been accomplished by the cinematograph in recording surgical operations, I shall project upon the screen several of the Doyen films, which I obtained from the Eclipse Company while in Paris last summer. I regret that none of the color films were available, but these will suffice to show what can be done with an ordinary instantaneous film, and I trust it will be sufficiently satisfactory and impressive to encourage the belief that it will not be long before our own enterprising teachers and operators, on this side of the Atlantic, will adopt this method of recording their most typical operations. It is evident that the outlay would at the start be considerable, but in every great university or teaching center the services of a competent photographer especially qualified for cinematographic work should be available. Some of this work could be done by individual initiative. The prospect of the expense is not so alarming when we consider that the cost of an outfit has been very much reduced both in France, by improvements made by the Pathe Brothers, and in this country by the efforts of the Edison Kinetoscope Company. In a recent letter (November 28) kindly referred to me by Dr. LeConte, of Philadelphia, the Edison Company announces that it expects to have very shortly a Home Kinetoscope which is both a motion picture and stereopticon apparatus, projecting pictures of different sizes. A notable feaure of this machine is that it uses a film which contains three rows of pictures which enables the operator to exhibit on barely 80 feet of film the equivalent of 1,000 feet of the regular professional film. As the new film will sell for 15 cents per foot, making the cost of the 80-foot film $12, as against approximately one hundred, or the equivalent in professional films, you will realize that the cost has been greatly reduced and the kinetoscope made much more available to the general public. This new instrument will, it is announced, be listed at about $50, making it comparatively cheap and also available to the individual teacher.

The purpose of the company in issuing these new machines and films is to make them especially useful and available for educational work in schools, churches and all kinds of organizations. By this means we see the time rapidly approaching when the surgical specialist or teacher of surgery may keep a cinematographic record of his own operations and thus establish the basis of a mutually cooperative and interchangeable cinematographic surgical clinic in which all the interested workers can participate.

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COMPARATIVE OBSERVATIONS ON BIOLOGICAL CHARACTERS OF SP. PALLIDA AND SP. PERTENUIS.*

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The problem of the relation between syphilis and yaws has been approached from several directions and practically all modern observers have agreed that these diseases are distinct. Clinical differences have been clearly pointed out by Castellani.[1] Differences in immunity tests, in experimental lesions and in serum reactions have been recorded by Charlouis,[2] Castellani,[3] Neisser, Baermann and Halberstadter,[4] Ashburn and Craig,[5] Nichols,[6] Baermann and Wetter,[7] and others. Since the discovery of Sp. pallida and Sp. pertenuis, comparative observations on the organisms themselves have naturally been attempted, and in this paper it is proposed to summarize the results of these observations. Our knowledge of the causative organisms is still rudimentary in most respects, and we cannot expect at this stage to correlate biological characters and pathogenic properties; but enough observations have already been made to warrant some consideration.

Before attempting to differentiate within this group of organisms, it is natural to inquire what relations the group as a whole bears to other organisms. Eventually, no doubt, such an inquiry can be answered with some certainty, and the answer will help in rounding out our conceptions of nature and of disease, but at present it must be confessed that little can be learned by looking in this direction. As Fantham[8] says, "The literature on spirochaetae, at present, is in a state of the utmost confusion." Evidences of this confusion are not far to seek. On every hand we find directly contradictory statements concerning the presence or absence of an undulating membrane, on the presence or absence and significance of flagella, on the occurrence of transverse or longitudinal division, on the nature of granules, and on the various stages of life history. To quote Fantham again, "The accounts of Sp. plicatilis, the type species of the genus, given by Ehrenberg, by Schaudinn and by Zuelzer, vary so much that they cannot be reconciled, and suggest that the authors may have dealt with different organisms." Some authors, such as Metchnikoff[9] and Doflein,[10] hold that our knowledge is not sufficient to mark the limits of the spirochaetae from those of the spirilla and vibrios; others, such as Holling,[11] find it easy to make clear distinctions. Some workers, such as Gross[12] and Zuelzer,[13] hold that many heterogeneous organisms have been included among the spirochaetae, and that the group must be radically split up; others, as Fantham,[14] hold that there are no sufficient reasons for forming new genera. It is evident that until the protozoologists or protistologists come to some agreement it is hopeless for the mere medical man to attempt to construct any etiological philososphy of the spirochaetoses.

In passing, however, two rather significant developments may be mentioned. In the first place, Doflein[15] has rearranged his classification of Protozoa on the basis of the conception that the spirochaetae form a bridge between the bacterial spiral forms and the flagellated protozoa. This displacement of the rhizopods as the lowest protozoa, in favor of the flagellates, in order to conform to his conception of genetic relationship, by such an authority as Doflein, commands attention. In the second place, salvarsan has proved to be equally

*Read at the ninth annual meeting of the American Society of Tropical Medicine, Atlantic City, June 3, 1912. Published with permission of the Surgeon-General, U. S. A.

efficient against the mouth spirochaetes, those of relapsing fever, those of foul spirochaetosis, and those of syphilis and yaws. This fact seems to argue for some fairly close relationship among these different forms, as salvarsan undoubtedly has quite a strict selective action.[16]

Morphology.

Coming now to the organisms in question, comparative studies of morphology have yielded some slight differential data. Schaudinn and Castellani[17] considered the two organisms practically identical in form. Prowazek[18] and Russell,[19] on the other hand, have described certain minute differences: Sp. pertenuis is thicker and less rigid; the coils are looser and not as regular; the ends tend to curl up to a greater extent; and forms showing longitudinal division are more numerous.

Such observations as I have been able to make on this subject have been made on one strain of pertenuis whose source has been described elsewhere, and which has been carried on in rabbits since February, 1910. On comparing fresh specimens of pertenuis and pallida from the rabbit, with the dark field apparatus, the two organisms are strikingly alike, and in some preparations, are indistinguishable. On the whole, however, one gets the impression that pallida has a more active corkscrew motion, that it is more rigid, and that its twists are closer and more regular. These observations, made with fresh material in which there is less apt to be artificial distortion, tend to confirm the conclusion of Prowazek and of Russell. In regard to thickness one must proceed with caution, as Nogouchi has cultivated a thick and a thin variety of pallida. Altogether, we may say that slight morphological differences, which, to be sure, seem insufficient for ordinary diagnosis, nevertheless do exist, and it may be that the greater rigidity of pallida, like the more glassy ectoplasm of Entamoeba histolytica, can be correlated with its greater pathogenic power. In regard to the vexed questions of the method of division, the significance of pointed ends, of flagella, and of granules, no comparative statements can be made.

Cultural Characters.

Both Sp. pallida and Sp. pertenuis have, within the last year, been grown in pure culture by Noguchi, and through his kindness I have been able to observe one strain of pertenuis and several strains of pallida for nearly a year. Both organisms are obligate anaerobes and grow slowly and diffusely in the depths of tissue-serum-agar. The first evidence of growth comes only 4 or 5 days after a transfer, when the lower part of the tract of inoculation becomes more distinct, and the media appears granular. Then a faint haze appears leading off from the tract to the side of the tube, and this extends and becomes more dense until most of the tube is opaque, with a sharp and even line of demarcation about one-half cm. from the surface of the agar. It is suggestive that occasionally no sign of growth appears for two, three, or even four weeks. After inoculating one strain of pertenuis and one of pallida on the same day and on the same media, I have noticed repeatedly that growth appeared in the pertenuis tubes one to three days earlier than in the pallida tubes, and that the growth became more dense. No other differences have been noted, and even here due allowance must be made for the fact that some varieties of pallida grow more rapidly and more profusely than others.

These cultures rapidly lose their virulence. Nogouchi, who first grew pallida in pure culture and reproduced lesions with cultures, had three takes out of four inoculations in a strain which had been grown for a month, and only two out of eight in a strain which had been grown four months; while on transfer from rabbit to rabbit the percentage of takes is practically 100. After a number of transplants, running from two to eight months, I have failed in six attempts to produce lesions with cultures of pertenuis.

Antibodies.

It was hoped that when cultures of the

spirochaetes were obtained these could be used for various diagnostic and differential serum tests, such as agglutination, precipitation and lysis, but no definite progress has been made in this direction, partly on account of the technical difficulties of handling anaerobes and of examination by the dark field microscope, and partly because the cultures, along with loss of virulence, may possibly lose their antigenic powers. The anaerobic nature of the growth has made the separation of the organisms from the media difficult, and these organisms are so sensitive that even the addition of ordinary salt solution will immobilize them. Schereschewsky," working with mixed cultures of pallida and their filtrates, was unable to demonstrate any agglutinins or precipitins in syphilitic sera. Of course such antibodies may not exist, but the presumption is that they do exist.

Complement Fixation.

Both pallida and pertenuis give rise to the Wassermann reaction in man and in experimental infections in animals, especially in the rabbit. In man the reaction with pallida is stronger and much more persistent. With specific antigens, however, as Nogouchi[3] has pointed out, no reaction occurs in rabbits. Craig and I have had the same experience, as is shown in Table 1.

TABLE I.

Complement fixation tests with sera of rabbits infected with sp. pallida and sp. pertenuis and specific culture antigens.

The stock antigen was made from the liver of a syphilitic foetus. The other antigens were made as follows: two tubes with a rich growth of one and two months were selected; the oil was poured off and the tube filled and broken open; the agar column was put in a sterile Petri dish, the upper part was cut away and the tissue picked out. The media was then shaken up with ten times its weight of absolute alcohol and allowed to extract for ten days, with frequent shaking. The fluid was then filtered, evaporated to one-third its volume and used in a dilution of one to ten; titrated and 0.1 c.c. used as antigen. The sera were inactivated and used in amounts of 0.1 and 0.2 c. c.

Rabbits infected with pallida and pertenuis gave a double plus reaction with the stock antigen of syphilitic foetal liver, but no reaction with specific culture antigens either at the height of the lesion or after recovery. This is one more fact which tends to prove that the usual Wassermann reaction is not a strict antibody reaction, but is more in the nature of an indifferent chemical or physical reaction. Nogouchi has obtained some results with specific culture antigens in the later stages of syphilis, but there is some question as to the nature of these reactions, as Craig and I have seen the same results with an alcoholic antigen of Sp. dentia. The possible significance of these findings will be discussed in a paper which will appear shortly. One significant feature is the fact that no positive reactions have ever been obtained with an uninoculated culture medium used as an antigen. Schereschewsky, on the other hand, using horse serum media obtained positive results with

Sp. Pallida	Stock Antigen	Pal.	Per.	Dent.	Control	
Rabbit 1-77	—	—	—	—	—	Before lesion
Rabbit 1-79	++	—	—	—	—	Active lesion
Rabbit 1-75	++	—	—	—	—	Active lesion
	—	—	—	—	—	12 days later, lesion disappearing
Sp. Pertenuis						
84	—	—	—		—	Before lesion
86	—	—	—			Before lesion
85	++					Active lesion
	—	—	—		—	13 days later
	—	—	—	—	—	30 days later, lesion gone
Normal rabbit	—	—	—		—	
Normal rabbit	—	—	—		—	

his uninoculated control. It may be recalled that a year ago I reported to the Society some results of efforts to use extracts of infected testicles as antigens.[24] Nothing conclusive could be learned in this way, however, as extracts of normal testicles frequently give positive reactions. In the case of our culture antigens the uninoculated control behaves satisfactorily, but non-specific or possibly group reactions occur with cultures of other spirochaetae. Specific fixation in human yaws has been reported by Castellani[25] and Bowman,[26] using extracts of yaws as antigen, but these results could not be duplicated by Baermann and Wetter[27] in man, nor by ourselves in animals.

Cutaneous Reaction.

Nogouchi[28] was the first to succeed in producing definite skin reactions in man with his culture material—luetin. This subject is still in the developmental stage, however, as some strains seem more suitable than others, and the reactions so far occur chiefly in the tertiary and hereditary forms of the disease. As far as I know no comparative experiments have been made with different spirochaetae.

Comparative observations on strictly biological characters of the two organisms come to an end here, and it must be admitted that they are sufficiently meagre. Possibilities, however, have been opened up in several directions, and we may expect further information in the near future. Already we have additional and positive knowledge of an indirect sort in recent experiments with rabbits and in the action of salvarsan.

Experimental Lesions in the Rabbit.

As is stated above, distinctly different lesions have been produced in monkeys by inoculating the two spirochaetes. These have been noted by Halberstadter and many others. The lesion with pertenuis is more like the human yaw in being fungating and rich in serum; local autoinoculation is also distinctive. In the rabbit there is no marked difference in testicular or scrotal lesions except that the incubation period with pertenuis is considerably shorter in the case of scrotal lesions. Castellani, however, working in Ehrlich's laboratory with a strain of pertenuis which I supplied, has recently succeeded in producing a generalized infection with pertenuis. According to Castelli[29] the lesions produced by pertenuis, which occur chiefly about the head, are distinctive. In a personal communication he says, "According to my opinion those appearances on the head are characteristic for frambœsia in their macro and microscopic signs. I have never had corresponding results in rabbits injected with syphilis." These differences in lesions in the last analysis must, of course, be referred to biological, or, in other words, chemical or physical differences in the two organisms.

Reactions to Drugs.

In regard to mercury, Baermann and Wetter have observed that the Wassermann reaction may disappear in pertenuis infections after one or two injections of the salicylate—which is certainly not the experience with pallida infections. The most marked difference in reaction, however, is seen with salvarsan. In experimental infections in the rabbit I found that pertenuis infections could be permanently cured with doses which allowed relapses with pallida infections,[30] and Castelli says, "As to the chemotherapeutic effects, I can confirm your results that frambœsia heals with a smaller quantity of salvarsan than syphilis does." Striking confirmation of these laboratory findings has been given by clinical experience. For example, Rost[31] has reported that out of 500 cases of yaws 81.8% were cured with one intramuscular injection, 15% with two, and the remainder with three injections, a total of 100% of cures. It is common knowledge that in syphilis the results have been worse than the reverse of these figures with one injection; it is only too true that less than 20% of miscellaneous cases can be cured with one injection. What is the cause for such radically different results with organisms which apparently resemble each other so closely? Evidently underneath apparent re-

semblances there lies a very real difference in resistance—but in what this consists we do not yet know. Is it a mechanical property which allows one organism to penetrate the tissues more deeply, or a resistant stage or some other defensive power?

Conclusion.

In conclusion, in spite of the well-known fallacies of genealogical theories, one is tempted to speculate on Doflein's grouping of the spirochaetae. Doflein places first the saprophytic spirochaetes which are found about the genitals and mouth, then the parasitic spirochaetes which may cause or at least grow in local lesions, then the blood, and finally the tissue parasites. In this connection one fact about yaws, which is rarely mentioned, should be emphasized, and that is that yaws frequently is a purely local skin disease like pemphigus, and if it spreads, spreads by autoinoculation. Of course, generalized eruptions are probably the rule, but I have seen a number of cases in which one or two yaws would occur at the point of contact, as on the neck of a parent who carried a child with yaws on the lips, and no other lesions would occur in months of observation. Then again, when the spirochaetae do circulate they find their way directly back to the skin, for which they seem to have an especial affinity. With such considerations as a starting point one may imagine that pallida and pertenuis were originally represented by one form or two forms which lived on man as a saprophyte, then as a local parasite, and that certain pre-pallida strains developed into blood and lymph parasites, while the pertenuis strain kept to the skin directly or after circulation.

A review of our present knowledge of the biological characters of Sp. pallida and Sp. pertenuis throws but little light on their distinctive pathogenic properties and shows the need for further investigation along some of the lines indicated.

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HAEMORRHAGIC MALARIAL FEVER AND ITS SUCCESSFUL TREATMENT WITHOUT THE USE OF QUININE.*

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Haemorrhagic malarial fever, as a distinct disease, was unknown to the physicians of Alabama prior to 1867. True enough there were scattered here and there a few cases at a much earlier date, but it was regarded by the physicians of that day as a malignant form of malarial fever. It did not attract much attention until the year 1867, or perhaps a little earlier, when it prevailed to an alarming extent along the water courses of the Southern States. Almost every community within this area was afflicted with the terrible scourge. The physicians were nonplussed; they had never seen anything like it before; they began to ask themselves the question, has a new disease sprung up among us; if so, what is it and what is the treatment? Consultations were held with physicians of wide experience, still the mortality was fearful. It was observed that haemorrhagic malarial fever originated only in malarial regions, though the morbific paroxysm may occur after the removal of the subject of it to a healthy locality; also in the immense majority of cases, it attacks persons who have a malarial cachexia and a history of chronic chills. In a small minority it attacks persons who, while they have been much exposed to malarial influences, have still remained apparently as well as usual up to the moment of the malignant outbreak. With this testimony staring us in the face, it was but natural that our physicians should regard it as a malarial fever and resort to quinine, the great anti-malarial remedy. Our medical colleges taught that quinine was the sheet anchor in this as in all malarial troubles. I remember in 1877 the late Dr. George A. Ketchum, then professor of the practice of medicine in the Mobile Medical College, in lecturing on the treatment of haemorrhagic malarial fever, used these words: Give quinine, 40, 50 and 60 grains at a dose and *I will be responsible* for the result. These words coming from a man of unquestioned ability, still ringing in the ears of his students as they went forth to battle against this terrible disease, sent many patients to their long resting place.

Although the history of haemorrhagic malarial fever leaves no doubt as to its malarial origin, yet is it a purely malarial fever due to the intensity and activity of malarial parasites? I think not, for the following reasons: First, because in some of the most intensely malarial regions, haemorrhagic malarial fever is unknown; second, because from almost time immemorial malarial fevers have been met with, from the simplest chill to the most malignant congestive, without this peculiar renal complication; third, because the negro is almost immune from the disease though more subject to malarial attacks than the white man; fourth, because there is a notable decrease in its recurrence in the last few years, which cannot be said of malarial diseases; fifth, because quinine is not a specific in this as in malaria; sixth, because there is a notable absence of malarial parasites in the blood.

I realize that I am not in accord with a majority of the profession on this subject, but I am of the opinion that there is a morbific poison which enters the system from without, or exists *sui generis* in certain individuals, which, when allied to the malarial poison, causes an explosion, as it were, resulting in a disintegration of the red blood corpuscles, with all the concomitant symptoms of this terrible

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malady. When this transformation takes place the malaria loses its identity and quinine ceases to be a factor in its treatment.

Some observers, notably Well and Daniels, maintain that it is due to a certain species of the Anopheles, namely, Myzomyia funesta, because it seemed to be more prevalent where this variety of the mosquito abounds; but I do not think this is conclusive. Others contend, among them Dr. Robert Koch, with some show of reason, that it is due to quinine poisoning; that it is simply a quinine haemoglobinuria. Dr. Koch endeavors to substantiate this view by citing a large number of cases, nearly all of which had a history of having taken quinine shortly before the paroxysm or flow of bloody urine, and none of them gave a history of taking no quinine.

I am not prepared to accept this view in toto, because I have seen patients have haemoglobinuria without a history of having taken quinine; but I am firmly of the opinion that quinine is synergistic, and often precipitates an attack in persons who have been exposed to malarial influences, or who have been having chronic chills. I have known haemoglobinuria to be produced in certain individuals suffering from malaria by the administration of large doses of quinine, have been able to produce it myself, at will, in such patients.

From the investigations of Plehn and others, we are justified in drawing the conclusion that it is very probable a change is produced in the blood of certain persons by the continued action of quinine and special malarial parasites, making haemoglobinuria possible, for it has been frequently observed that the same persons can take quinine when free from the effects of malarial parasites without having these bloody discharges from the kidneys, whereas they will surely follow its administration, if the person has an active infection, or has been recently infected with malarial parasites.

Deaderick has compiled statistics gathered from various sources giving the comparative death rate with the quinine treatment and without. Treated with quinine, 1,821 cases, 472 deaths, 25.9 per cent. Treated without quinine, 1,006 cases, 112 deaths, 11.1 per cent showing a mortality of nearly 15 per cent higher with quinine than without.

The late Dr. R. D. Webb, in a masterly paper read before this association in 1876, gave a most complete and accurate description of the clinical history of this disease that I have ever seen, but he did not carry his investigations far enough; he regarded it as purely a malarial malady, and gave quinine with an unrestricted hand. If he had proceeded a step farther, and with the aid of the microscope, examined the blood of a haemorrhagic patient, he would have discovered that the malarial parasites were conspicuous for their absence.

A. and F. Plehn and other investigators tell us that when the blood is examined a short time before the paroxysm, 95.6 per cent of cases are teeming with malarial parasites, on the day of the hemoglobinuria 61.9 per cent, the day after only 17.1 per cent, showing conclusively that malarial parasites cannot thrive in the diseased blood corupscles of a haemorrhagic patient. J. W. W. Stephens, in Osler's Modern Medicine, says, "As parasites rapidly disappear, it is not necessary to administer quinine in these cases. In all cases a blood examination should be made, and if parasites still persist with a continuance of the fever, then the question must be carefully weighed as to whether quinine is to be given or not; if it can be avoided, we should say it is better to abstain."

He admits that even if there should be a few straggling parasites in the blood, the administration of quinine should be avoided, because it disturbs the stomach, it increases the nausea, it depresses the vital forces and last, but not least, it paralyzes the excretory nerves of the kidney, lowering the blood pressure, thereby blocking up the uriniferous tubules, resulting in suppression of urine, which is a fatal symp-

tom. I have never seen a case of suppression re-established, though Deaderick says it occasionally happens that urinary secretion is re-established after auuria has persisted, even as long as five days; in such cases, however, most die of complications during convalescence. The outlook is very grave when suppression lasts longer than twenty-four hours. Death usually takes place after three or four days, though Plehn reports a fatal case where life was prolonged twelve days after the onset of suppression." This I am inclined to doubt.

Whether you believe this view or not, the result of experience is undoubtedly against the administration of quinine.

Treatment.—As a toxaemic condition confronts us, the treatment may be summed up in four words: Elimination, prompt, quick, heroic. The more recent studies of the bacteriologist show the perils lying in retention of toxins in the body. Failure of renal elimination *spells* death. The one thing needed above all else is free and speedy purgation, and there is no therapeutic agent in my experience equal to the sulphate of magnesia on account of its greater osmotic action and speedy results. The next in importance to purgation is free diaphoresis, to secure full elimination through the skin and lessen the strain on the kidneys. Dr. R. S. Williams several years ago reported the case of his own son suffering from anuria and uremic coma, snatched from the very jaws of death by the hypodermatic injection of pilocarpin. In less than five minutes after the injection there was a profuse perspiration all over his body; in four hours he had a free discharge from the bowels, and in eight hours a copious discharge from the bladder, the first in forty-eight hours, which gradually increased to the enormous amount of 148 ounces in twenty-four hours, gradually subsiding in eight or ten days, with complete recovery. When first called to treat a patient suffering from haemorrhagic malarial fever, I give a large dose of calomel, twenty grains or more, to arouse the glandular secretions, and for fear a sufficient amount of the saline will not be retained to produce the desired effect. Have him well covered with blankets, place hot water bags or heat by other means around the body in order to produce free and prolonged diaphoresis. An hour after giving the mild chloride, I give a tablespoonful of sulphate of magnesia every two hours until the desired effect has been produced. If the salts cannot be retained I give the following prescription, which I have found to agree with the most delicate stomach:

R Magnus sulph. drachms II, Acid Tartaric drach I.
Tr. Cardamon Comp., drachms IV.
Aqua q. s., ounces IV.
Sig.: Two tablespoonsful every two hours till the desired effect is produced.

If there is a copious flow of urine from the beginning and throughout the attack, the patient will rapidly recover and the urine will clear up in from thirty-six to forty-eight hours; but if the urine is scanty from the beginning and continues so, although it may clear up and be perfectly normal in appearance, yet the patient is in great danger, and a fatal termination may be looked for. To relieve the distressing nausea which is so exhausting in these cases will often tax the ingenuity and patience of the attending physician. Copious draughts of very hot water will have the effect of washing out the superabundance of bile that often finds its way into the stomach and enables the patient to vomit with less strain, and renders him more comfortable at least for a while; this can be repeated as often as necessary. The nausea will often subside after there have been several movements from the bowels. If the nausea still persists the hypodermatic injection of ¼ gr. morph. sulph. will often have a magic effect in allaying the irritability of the stomach and enable the patient to retain a sufficient amount of the salts to have the desired effect.

Iron, ergot and the astringents which were formerly so much in vogue by the older practitioners have no place in the therapeutics of

this disease. They increase the nausea, interfere with digestion and assimilation, and retard elimination. If the patient should have a chill, after beginning the eliminative treatment do not think you have made a mistake in not giving quinine, because I have seen a chill come on while the patient was thoroughly under the influence of the drug, but push the elimination, and my word for it, if the eliminative organs respond to the treatment, your patient will not have another chill and the urine will begin to clear up in thirty-six hours.

The most important indication in the treatment is the prevention of suppression, which is the cause of a large majority of our fatal cases. Medicinal diuretics usually do harm and do not increase the flow of urine. Normal salt solution, first recommended by Lewis, of North Carolina, is a valuable therapeutic agent in warding off anuria; it can be given by the rectum or in severe cases by hypodermoclycis every four to six hours; it has the effect of preventing heart clots, it increases the volume of blood, raises the blood pressure, and increases the flow of urine, which is the end to be attained. The late Dr. W. C. Jackson reported marked success with the hypodermatic injection of atropia. Various other remedies have been used with more or less success.

Of course some patients will die under any treatment, particularly those whose resisting forces have been greatly reduced by malarial cachexia. Supportive measures are essential. Alcohol should not be used under any circumstances. Strychnine, sparteine, digitalis and such agents that will increase the arterial tension and support a flagging heart are the ones to be relied on.

After the acute symptoms have passed, some good reconstructive tonic will complete the cure.

A MALARIAL HOT-BED WITHIN SIGHT OF THE NATIONAL CAPITOL.*

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Ft. Washington, Md.
(Concluded from August.)

In connection with the matter of protection against mosquitoes I beg to state that early in January, 1912, I sent a communication to the commanding officer, Fort Washington, setting forth the unsatisfactory condition of the screening of quarters and barracks here, urging that the screening be made complete and effective and also that ventilator openings and chimney and fireplace openings be properly screened before the beginning of the insect season. This communication was duly approved and forwarded, and was returned by the chief quartermaster, Eastern Division, requesting that certain estimates be made and that definite information as to the defects of the present system be furnished. Thereupon the attached memorandum of defects was furnished. It is presumed that favorable action is now proceeding and that the matter of defective screening will be remedied early this spring.

Memorandum Report on Unsatisfactory Features of the Screening at Fort Washington, Maryland.

The present screens are unsatisfactory for the following reasons:

1. They are of larger mesh than 18 per linear inch.
2. They close but the lower half of the window openings.
3. They are inside screens, and must be raised to permit access to the window sashes for opening and closing windows.

Authorities agree that the mesh should be as fine as 18 to the linear inch to insure against mosquitoes entering through the meshes.

*Read at the ninth annual meeting of the American Society of Tropical Medicine, held at Atlantic City, June 3, 1912.

Half screens are probably more effective against the escape of mosquitoes and flies that have found their way indoors than they are against the entrance of these insects. Where they are used it is bound to happen, as shown by experience, that the unscreened halves of the windows will be opened frequently and will often remain open. Full length outside screens will prevent this occurrence.

Screens of the type of those recently installed at the Post Hospital, Fort Washington (metal framed) are desirable on account of their durability and the ease with which the units may be handled, installed and removed.

The present screening at Fort Washington has always been defective, and without doubt no small degree of the prevalence of malaria here is attributable thereto. Without the correction of the defects our anti-malarial efforts must fail in large degree.

Submitted January 31, 1912, Ft. Washington, Md.

Mosquitoes. At the time of my arrival at Fort Washington in November, 1911, the mosquito season was at an end and petrolizing had been discontinued for the winter. A few indoor anopheles were taken during November. During a warm period of two weeks in December mosquitoes appeared at the post and adult anopheles specimens were captured in the hospital and other buildings. They were sluggish and inactive, and showed no disposition to bite. At the same time an unsuccessful search for larvae was made in places where breeding might naturally be expected to occur, but no breeding mosquitoes were found.

It is believed that these mosquitoes were survivors of the army of 1911, which came out from their hibernating haunts and hiding places, called forth by the unseasonable warmth and not bred from the egg during the mild weather. Since the severe weather of early January which continued, somewhat modified, throughout the month, with its heavy snowfall, thick ice and zero temperature, no appearance of mosquitoes has been noted by me indoors, nor have I been able to learn of any through inquiry. It is not unlikely, however, that indoor mosquitoes exist, as a few have been noted as present in living quarters at some time during the winter seasons of all recent years. To what extent infected anopheles females at this post hibernate or remain hidden indoors through the winter, to reappear and become active as breeders or vectors of malaria in the spring, is an undetermined matter and a rather indeterminate one. Personally, I fancy that surviving infected mosquitoes are much less concerned in the perpetuation of malaria here than human gametè carriers, for the discovery of whom we are now conducting an active search in this command and in the neighborhood of this post.

In considering the second of these medical questions, the duration of treatment of malaria cases, one has to give due weight to the opinions of observers engaged in anti-malarial work elsewhere, and this I have endeavored to do. Accordingly I quote here certain recently expressed views which have a certain bearing upon our problem. Our own opinion, derived from experience, will be stated later. This question of duration of treatment also includes the question of the effect of quinine upon malaria parasites and the question of the duration of infectiousness in man.

The views of Darling and Thomson with regard to certain of these matters will be observed to be quite similar. Darling's views antedate those of Thomson, according to the dates of publication, but the observations come from different parts of the world.

In regard to the effect of quinine upon malaria parasites in man, Darling is of the opinion that the drug causes the gametes to disappear gradually from the peripheral circulation by the destruction of the young forms, the gametes being phagocyted by splenic and hepatic endothelium, and he concludes that quinine in solution, ten grains three times a day, will gradually reduce the sexual forms in man to a non-infective minimum in varying periods of from a few days to a few weeks, according to the severity of the infection. In simple tertian malarial fever gametes disappear from the peripheral blood within two or three days under quinine treatment, and even when quinine is withheld, if the patient is at rest, according to Darling.

There are never so many gametes in the peripheral blood in simple tertian malaria as in malignant tertian malaria. As a consequence in infected mosquitoes simple tertian zygotes are less numerous than malignant tertian zygotes.

Speaking of the production, life and death of crescents in malignant tertian malaria(3), Thomson expresses the belief that crescents develop from ordinary sexual spores of plasmodium falciparum because of a developed immunity on the part of the human organism to these asexual spores. He believes that the place of development of crescents is some-

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Abstract J. A. M. A., Sept. 19, 1910.

1. S. T. Darling, Malaria in the Panama Canal Zone, Annals of Tropical Medicine and Parasitology, Liverpool, July, 1910.

where in the internal organs and that they appear in the peripheral blood suddenly, after infection has lasted ten days or more, in broods, either daily or upon alternate days, according to the time of asexual sporulation, quotidian or tertian.

He believes that the life of the crescent is but a few days and that quinine has no direct destructive action upon these gametes at any time, but that it destroys the asexual source of supply.

Thomson is of the belief that quinine reduces the number of crescents to less than one per c. m. m. of blood within three weeks, if given in daily doses of 20 to 30 grains, and that when given in small doses it tends to increase crescent development by favoring the development of immunity to the asexual parasites.

He states that methylene blue in doses of 12 grains daily reduces the number of crescents and would seem to have some direct destructive action upon them.

Darling (loc. cit.) has attempted to determine the limit of infectiousness of man by differential counting of leucocytes and determining the ratio between crescents and leucocytes in peripheral blood at various times; by weighing mosquitoes in order to estimate the amount of blood retained by a mosquito and finding the approximate number of gametes ingested; determining by dissection the number of gametes phagocyted and destroyed; by dissecting mosquitoes which had fed but once on patients whose ratio of crescents to leucocytes had been estimated, after a period of captivity and subsequent vegetable feeding. He estimated the probable limit of infectiousness to be about one gamete per 500 leucocytes and believes that a person with more than one gamete per 500 leucocytes, or 12 gametes per c. m. m., is infective.

He concludes from observation that daily doses of quinine (10 grains t. i. d.) will reduce the sexual forms of the estivo-autumnal parasite to a non-infective minimum in from a few days to two or three weeks, depending on the severity of infection.

Thomson (4) notes a remarkable variation in leucocytes, numerically, at different times of day in malaria, and believes that he is able to correlate the changes with the changes in the stage of development of the parasite and with the number of parasites present in the blood. He believes that the greater the number of parasites, the greater will be the leucopenia. During the liberation of malarial virus in the blood, at times of sporulation, the percentage of uninuclears falls greatly, according to his observations. He also notes that with the fall of temperature occurs a rise of leucocytes, numerically, and he considers this phenomenon more delicate than temperature variations.

After the disappearance of demonstrable parasites from the blood and the subsidence of fever, Thomson believes that there remains for some time a typical diurnal variation in leucocytes which he ascribes to the persistence of small numbers of parasites liberating toxines upon sporulation and considers of diagnostic value.

Having observed the same variation in Hodgkin's disease, and in carcinoma, he offers the suggestion that these affections are possibly parasitic also.

In regard to the effect of quinine upon malaria parasites, it seems to me that the assumptions of both Darling and Thomson as to the non-effectiveness of the drug upon gamete forms of malaria parasites are not altogether acceptable. To assume that these gametes simply die or are phagocyted and that quinine has no effect upon them requires rather more proof than has yet been submitted. The views of Thomson, also, that crescents appear in groups or broods from asexual spores, live but

3. Thomson, D., Annals of Tropical Medicine and Parasitology, Liverpool, April, 1911.

4. British Med. Jour., Dec. 16, 1911.

a few days and are not, directly, influenced by quinine, likewise requires proof.

That the crescent form of gamete is a resistant form of malaria parasite is generally conceded, but that it is uninfluenced by quinine is hardly admitted. It is quite as easy for me to believe that the crescent gamete is the resistant form as it is to believe that the ordinary asexual spore, from which it is said to be derived, is resistant or that it fails to continue its cycle by reason of developed immunity on the part of the human organism.

If this be so, the explanation of ultimate gamete disappearance, under quinine treatment, from the peripheral blood at least, needs but the assumption that the blood finally contains sufficient quinine to destroy it in spite of its resistance. The presence of a protective capsule in the case of crescents, as claimed by some observers, would partly explain this resistance.

With regard to the method of determining infectiousness of the individual by determining the ratio of gametes to leucocytes in the peripheral blood and the declaration of a non-infective minimum (Darling); and with regard to substituting a supposed typical diurnal variation of leucocytes for thermometric observations and the assumption of a persisting infection after the disappearance of demonstrable parasites (Thompson), I believe that these measures, aside from being of unproven reliability, are impracticable and unnecessary. In my opinion malaria may always be diagnosticated directly by microscope and its cure may be established by the same diagnostic instrument, practical measures applicable everywhere by competent men. So firm is my conviction in this matter that I personally decline to diagnosticate malaria in the absence of demonstrable parasites and I shall continue this practice, if permitted to do so, in my anti-malarial work at Fort Washington.

One must make due allowance, of course, for inability to find parasites in individuals who have received quinine before coming under his observation, a very common occurrence indeed. But in my experience these individuals will eventually show parasites in the peripheral blood, unless the quinine treatment has been curative. In these cases the leucocytic indications shown by differential counts are very useful. It should be understood that the term "blood search," as used here, includes the examination of several smears taken at appropriate intervals. Little diagnostic value is attached to a single negative finding.

The practice of determining the endemic malarial index of a community from the splenic index of its population and other data, as proposed by British workers, must ever be of little worth compared with a malaria census determined by accurately recording all cases of malaria and examining blood smears of practically the whole population, as we hope to do here. Moreover, there is a growing belief, here in America, that the study of malaria cannot be reduced to pure mathemtaics, as certain recent essayists would lead us to believe. Certainly the only reliable elements entering into a mathematical calculation of malarial prevalence are those determined by microscopic blood study and by case incidence.

This brings us to the consideration of (3) the cause of recurrence, and the determination of the number of cases which are truly recurrent.

Castellani and Chalmers (7) state that "the macrogametocytes are extremely persistent and can wait in the body for a long time until some chill or accident lowers its resistance, when they become active and develop merozoites by parthenogenesis, thus accounting for the relapses and recurrences of malaria even months and years after having left a tropical country. Hence in malaria there is a latent phase which is capable of lasting an unknown time, but upon this subject more information is urgently needed." They also give as one of the most important questions in malaria requiring further elucidation "the form in

which the malaria parasite lies dormant in the human body (with special reference to the parthenogenesis of the macrogametocytes)."

Christophers and Stephens (8) say: "Further, there is a certain amount of evidence to show that a gamete (female) in the blood can undergo a kind of retrogressive development and give rise by parthenogenesis to young parasites (i. e. schizonts). If this is so, it would explain the supposed function of old attributed to crescents (gametes) of producing relapses."

Krauss (2) reminds us that we have recurrences in malaria from (1) reinfection from without, (2) reinfection from one's own gametes, (3) from resegmentation of macrogametes without the aid of anophelines and reintroduction; and possibly by plastogamy (according to Craig).

In any case, he says, it is to be remembered that it is the symptomless gamete carrier who perpetuates infection and he considers a campaign against gamete carriers more valuable in the eradication of malaria than all other methods combined.

He considers it desirable to interrupt quinine therapy from time to time and to continue it somewhat longer than is usual. "We will probably always have gametes; let us see that they remain sterile."

Krauss advocates active and persistent cinchonization for at least 30 days.

Darling (5) considers the destruction and prevention of development of the sexual parasites in man as most important and believes that it may be accomplished by (1) appropriate quinine treatment of all gamete carriers; (2) by occasional quinine treatment to destroy latent malaria; (3) by periodical blood examinations for the detection of gamete carriers and latent malaria in order to carry out appropriate treatment.
this purpose.

He believes that 30 grains of quinine sulphate in solution daily is an efficient dose for the purpose.

In the light of these authoritative opinions we are justified, it seems to me, in considering resegmentation of macrogametocytes, retrogressive development, as a cause of recurrence of malaria, a true relapsing form. This is the only form of recurrence in which the mosquito does not act as a vector, including as gametocytes (for this purpose) the cyst-like bodies resulting from intra-corpuscular conjugation described by Craig.

Fortunately the treatment indications are identical in malaria, however induced or perpetuated, and I am strongly of the opinion that macrogametocytes disappear from the blood under the direct influence of sufficient quinine. In fourteen recently observed cases of estivo-autumnal infection (malignant tertian)—(November, 1911, to March, 1912)—there is every evidence to indicate that permanent disappearance of both ring forms (asexual) and crescents (sexual forms) from the peripheral blood occurred under the direct influence of quinine in dosage overwhelming to the parasites. That the same is true of the blood in the internal blood recesses of the body can, of course, be stated with less certainty.

In the above cases frequent blood searches were made in each case as a check against error.

It may be said in passing that the only leucocytic phenomena observed in a series of nearly 500 blood examinations of malaria infected individuals and those recovered from malaria within one to six months, were the phenomena agreed upon by observers generally for some years past.

Christophers and Stephens state them thus under the "Subsidiary Signs of Malaria." Leucocytic variation: Obvious increase in the large mononuclear leucocytes during the apyretic periods of malaria.

7. Manual of Tropical Medicine, pp. 292, 631.
8. Practical Study of Malaria, p. 57.

2. At Louisiana State Medical Society, June 1, 1911. (J. A. M. A., July 8, 1911.) "The Role of the Gametes in Relapsing Malaria."

Failure to observe this during the period of low temperature is presumptive evidence against malaria. The normal ratio of white cells to red (1 to 500) is often increased (leucocytosis) to 1 to 250 or less during the chill, and is decreased (leucopenia) to 1 to 750 at the close of the chill, or to 1 to 900 during apyrexia.

Where the stained method of blood study is used, as in the above mentioned cases, differential counting is readily carried out in the blood search for parasites.

Shortly after my arrival at Fort Washington (November, 1911), I undertook to examine the blood of all persons who suffered from malaria during 1911, with a view to determining the number of those still infected (gamete carriers). In view of the large percentage of cases which were recurrent in 1910 and in previous years, and in view of the fact that more than a few of the 1911 patients had malaria in 1910 or had more than one attack during 1911, it was expected that a number of gamete carriers would be found. The result of this examination was surprising, few gamete carriers other than the crescent carriers referred to elsewhere being found among 100 individuals examined. Differential counts were also made in most cases with non-suggestive results.

The great majority of these persons were free from parasites (in the peripheral blood at least), at the time of examination. Apparently the after-treatment (the truly curative treatment) was fairly effective in 1911, nearly every man treated in hospital for malaria during the latter half of 1911 being required to report at the hospital daily for quinine administration for at least a month after his return to duty. Then the so-called prophylactic use of quinine throughout the command, while ineffective for the purpose designed, may have served as a useful adjuvant treatment in uncured cases. If one may judge of past years by this year's findings, a certain percentage of the annually recurrent cases are not true relapsing cases, but reinfections, although there is strong evidence that infections have persisted throughout the winter and year, with relapses at periods of weeks or months (sometimes unnoted), and that these infected individuals have been sufficiently numerous to furnish the malaria parasites for the mosquito broods of the following spring and summer.

The management of civilian cases of malaria occurring upon the military reservation is comparatively simple. All civilian individuals, infant or adult, members of families of employes, may be subjected to the same requirements as the military population upon pain of exclusion from the post. The cases occurring among the families of officers and enlisted men are not really difficult to deal with, except that considerable care, persistence and tact is called for to secure adequate after-treatment.

A post order covers all civilian cases specifically.

In the cases of individuals living outside of the reservation limit it is quite practicable to carry out treatment and after-treatment and to induce the patients to report periodically for blood examinations, if the individuals are members of soldiers' families; and these constitute a large part of the near-by population at Fort Washington.

In the cases of civilians who live near the post, but who have no connection with the military establishment, we are obliged to depend upon suasion. A certain small percentage of these persons are quite beyond our reach. To such as are willing to present themselves we accord treatment gratis.

An interesting though startling development in connection with my work at Fort Washington has been the discovery of a number of cases of estivo-autumnal (malignant tertian) infection among both soldiers and civilians of the post and vicinity. Although the records (see chart) show that only a few cases of this infection, occasional and scattered,

have been detected in the previous four years, my searches have disclosed the presence of 14 individuals (8 soldiers and 6 civilians), who were carrying about these dangerous parasites.

Most of these persons have been treated here for malaria during recent months, some of them in previous years, and it is undoubtedly true that some errors in diagnosis have occurred, the cases having been considered as simple or benign tertian infections. While it is impossible to say with certainty at this stage of our investigations that these 14 persons are the only ones who have recently suffered from infection with malignant parasites, it is my opinion that but few others, if any, will be discovered, and I feel reasonably sure that these 14 persons will no longer be dangerous to others, as all except one have been thoroughly treated for three months and have long since ceased to show crescents or ring forms in their peripheral circulations. The excepted cases, a civilian, removed from the vicinity and is no longer within our jurisdiction.

Of these 14 persons there were 11 adults and three children; four showed gamete forms (crescents) only; two showed ring forms only, and eight showed both ring forms and crescents and the clinical manifestation of fever, anemia, etc. In each case the hemoglobin percentage rose steadily under treatment until practically normal. The tolerance of these persons to quinine was remarkable and it was possible, as I believe it always is, to give the drug in sufficient dosage to cure.

Most of the hospital treated cases (soldiers) took 45 grains daily (15 grains in capsule t. i. d.) with comparative comfort, and one patient took 60 grains daily for some time without injury, incidentally gaining ten pounds in weight during the period. In but one case was it necessary to discontinue quinine treatment on account of deafness, and this soldier had a ruptured tympanum, received months before while at target practice from the discharge of a 12-inch gun. Moreover, he took the drug in daily doses of 45 grains for a month and was apparently perfectly cured at the time that quinine was discontinued. All others completed the after-treatment of three months as out-patients. Children took quinine readily when the drug was suspended in chocolate syrup. Rarely was there any disturbance from it requiring the discontinuance, temporarily, of the drug. During a part of the period of out-patient treatment quinine tablets of excellent quality had to be substituted for the capsules, but there was apparently no diminished effect of the drug.

The following family and neighborhood relationships were noted among the infected number: One husband (soldier) and wife; one father (civilian) and son; one mother (soldier's wife) and infant; two brothers-in law (soldiers). All of the civilians were neighbors. One married soldier was infected with malignant tertian parasites (a crescent carrier), while his wife suffered from a benign (simple) tertian infection with typical clinical expressions. Of the 14 cases three were married men, two were women, three were children and six were unmarried men.

But one case of foreign origin was noted: A Spanish-born recruit, formerly a sailor, who had suffered from "fever" in Mexico and South America during recent years and within six months of enlistment. This case was discovered within three weeks after his arrival here from the recruit depot.

Blood specimens, two or more slides at a time, from all of these persons were subjected to frequent examination during this period of treatment, the intervals between examinations never exceeding one week. These blood examinations, together with those previously referred to, approximated a total of 500 within three months, something of a tax upon a single observer engaged in other work, but nevertheless a necessary and important work which must be kept up in connection with any effective anti-malarial campaign.

The most refractory case in the matter of the disappearance of crescents was that of the Spaniard referred to. This case became clinically negative very promptly, but it was not until upwards of 600 grains of quinine had been taken that the last crescent disappeared from his peripheral blood stream.

The matter of disposing of these gamete carriers is one deserving some consideration. Personally I am of the opinion that all of these individuals may be cured by a proper course of treatment and it seems to me, therefore, that the first indication is to subject them to such curative treatment under proper surveillance. Having accomplished a cure, there is really no necessity for further action. However, in view of opinions, which prevail in certain quarters, to the effect that gametes may persist for months or years in the internal blood recesses of the body in spite of treatment, it is perhaps proper to recommend the transfer of these patients to localities where anophelines are not found and where, therefore, these persons cannot possibly menace others. As a precautionary measure such recommendations have been made.

To make sure that none of these individuals incur relapses or develop into latent cases, they should be subjected to frequent blood examinations for a year or more, wherever they may be.

With Craig (6), I understand a latent malarial infection to be one in which demonstrable malaria parasites are present in the blood of an individual who presents, at the time, no active clinical symptoms of malarial disease. An infection may be latent during the quiet periods between attacks of fever, chills or other clinical expressions, quite as well as before the initial clinical expression. Indeed, the majority of latent cases encountered will be of this type and not infrequently a latent case becomes an active one with clinical manifestations of fever and chills, or both, during the time it is being studied. This has occurred in a number of instances in my personal experience.

6. C. F. Craig: A Study of Latent and Recurrent Malarial Infections.

Summary.

In conclusion I offer the following summary of the situation and prospects of success at Fort Washington.

The measures proposed for the abatement of the malaria nuisance and menace at Fort Washington by the Board of Officers convened by the War Department order in 1911 included the following:

1. The purchase of mosquito-breeding swamp land adjacent to the reservation. Apparently there is little chance of an early accomplishment in this direction, the obstacle being lack of funds. Under present conditions money is apparently valued more highly than the health of 600 or more people whom it is intended to safeguard by this expenditure.

To quote from the proceedings of this board, "A strip of land shown in the accompanying map *must* be purchased that the necessary outlet for the drainage system may be installed and properly maintained." The amount of land required is 27 acres and the estimated cost is $5,000.

2. Thinning out trees and shrubbery and the creation of a denuded zone of land 125 yards wide, between the forest and the officers' quarters, barracks and hospital, to serve as a barrier to the flight of mosquitoes which find shelter among the trees and shrubbery. This work has been prosecuted to a very creditable degree by the post commander, who has accomplished with post labor a most gratifying amount of clearing. He is constantly prosecuting this work. Of the physical measures proposed, this is the most promising as well as the most immediately important one.

3. The conduction of storm water from parade, roads, batteries and buildings to the river, an engineering project, is being prosecuted as rapidly as funds and labor will permit, and with good prospects of ultimate accomplishment.

4. The systematic and methodical daily killing of all indoor mosquitoes. This measure, a most important one indeed, has been strongly urged and will be carried out during the coming season in all barracks.

Unfortunately, its effectiveness depends upon the carrying out of the next measure, 5, which there is some reason to fear will not be completed this year.

5. Effective screening (as elsewhere detailed) and its maintenance. The commanding officer and the special sanitary officer have done all that it is possible for them to do to secure adequate and effective screening throughout the post and it is hoped that the pleas and representations made will be effective. But fears have been expressed that the estimates submitted will not be allowed.

In this case the whole project for appreciably lowering malarial incidence at Fort Washington during 1912 will be seriously endangered and the responsibility for failure cannot rest with the Medical Department There is no more important link in the chain of defense than this measure, especially for the immediate future, and until the more formidable and difficult undertakings of clearing and drainage are completed.*

6. The establishment of a mosquito patrol to locate and oil all mosquito-breeding pools; to clear and dig small ditches and to fill shallow pools. This measure will be carried out thoroughly during the coming year. The special sanitary officer has made a suggestion, which he believes to be a practical one, to the effect that this work be performed, under strict medical supervision, by the five different companies of coast artillery stationed at Fort Washington, one or two ravines being assigned to each company.

In this way it is believed that the actual work could be done and maintained with far better results than by a squad of three men, as proposed and heretofore practiced. As the companies themselves will receive the largest benefit from this work, there can be no reasonable objection and the individual labor will be minimized. It is believed that company commanders would interest themselves and that a desirable rivalry could be encouraged with great benefit to the entire project.

7. The creation of a malaria census and continuous and persistent after-treatment of malaria cases for four months. These measures have already been instituted and are in operation, as indicated in the foregoing pages.

8. The voluntary use of prophylactic doses of quinine. My views and the present policy in this matter have already been recited. As an alternative measure I have proposed the following plan, which is now being carried out. All persons known to have suffered with malaria infections in 1911 will receive a month's treatment, beginning in April, 1912 (now accomplished), along the lines of the after-treatment accorded hospital cases. They will report at the hospital daily and receive and take 18 grains of quinine. By this measure we hope to cure all individuals who may be carrying gametes and who may have escaped detection accidentally in the wholesale blood examinations which have been carried out.

9. A recommendation that the forestry work be done by contract day labor, an allotment of funds therefor being made; and a recommendation for the sale of timber cut. This measure, unfortunately, has not received the necessary approval and we are still depending on post labor. There are no receipts from the sale of the valuable timber which has already been cut, nor prospects of receipts from that which remains to be cut. This is a formidable handicap to the commanding officer in his efforts at deforestation and clearing.

Finally, it is my opinion that the successful

* No remedial action has been taken (August, 1912). A recommendation to screen open fireplaces or chimneys was disapproved (by non-medical authority) upon the grounds that it was unnatural for mosquitoes to enter by fireplaces, etc. The entire project for protection for 1912 has been nullified by inaction wholly outside of the medical domain.

prosecution of this fight against malaria at Fort Washington depends upon certain conditions.

It is believed that the outlined program will be successful in materially reducing malarial incidence here, provided the present co-operation between the Medical Department and the commanding officer can be maintained, and provided that the present status of the special sanitary officer with regard to his control of all malarial cases, his authority to recommend and to oversee the carrying out of anti-malarial measures be continued.

It is likewise essential, in my opinion, that the special sanitary officer be both a competent sanitarian and an experienced observer of malaria, both clinically and microscopically.

DISCUSSION.

Dr. D. Rivas, Philadelphia—My experience has been that it is very difficult to get patients to take the quinine faithfully. Many advocate small doses of quinine, some advocating giving it before and others during the chills. My experience has been it is most efficacious to give the quinine, say, one hour after the temperature begins to fall. We know that at that time the parasite is very young, metabolism is very active, and the parasite is apt to take at that time more quinine than he will later—say after six or twelve hours. Doses of about 1-2 gramme or 7 1-2 grains always diluted with hydrochloric acid.

In regard to the recurrence of malaria, unquestionably these are attributable to bad management—that is to giving quinine at the wrong time.

Dr. William Kraus, Memphis, Tenn.—There is one observation I wish to bring out at this time in connection with this paper, in the hope that someone else may have had the same experience. It may have been accidental, but I would like to know if anyone else has had a like experience.

About a year ago I had a patient referred for the administration of salvarsan. On the day he arrived he had a chill and I could not give it to him then. The physician administering decided he would not quininize him but would await the result of the salvarsan. The result was partial disintegration of rings—estivo-autumnal form, and no subsequent paroxysm of this same fever. On the day following, however, the malaria became more active, but coincident with that there was the disappearance of chills and since that time the patient has not had any further recurrence up to the end of my observation of the case. It is possible this remedy may have a differential effect for the very thing we have not been able to do with quinine, and might be borne in mind.

Dr. John M. Swan, Rochester.—I would like to say one word about Rochester. My opinion is, and I used to teach my students, that it was necessary for them to administer quinine to their patients after their clinical recovery for at least two years. My reason for teaching that was that I accepted the theory that the recurrences or relapses were due to parthenogenesis. There always seemed to me to be a parallel between this disease and another which I think is due to an animal parasite, namely, syphilis. We know well that after the clinical manifestations of syphilis are gotten rid of, it is necessary to continue treatment for a long period to prevent tertiary symptoms.

I believe the administration of quinine will probably prevent relapses.

Referring to diagnosis of carriers by microscope, I would like to recall to your mind a case I reported in 1910. A patient who reported perfectly well; normal temperature, normal picture in regard to red cells, differential leucocyte count, etc. In March when there were no mosquitoes in the place had a typical attack with the organisms in the blood. It is possible for some one with the parasites in the blood to present a perfectly normal blood picture until he relapses.

Dr. Joseph H. White, President—I did not intend to say anything, but I feel impelled to do so. I feel from my own experience and that of others with whom I have been intimately associated that proper prophylaxis with malaria demands not only destruction of the mosquitoes, and the destruction of gamete carriers, but also the use of quinine as a prophylaxis.

Just one instance with regard to a unique case. Some four years ago I was called up at midnight by a gentleman and asked if I would not go to a certain town where he thought he had found a case of yellow fever. I went, very much afraid of finding yellow fever, looked the patient over carefully. I cannot say he had malaria. I looked at this man's blood for about an hour, taking two or three specimens and got nothing. Went back and looked at him again after being away two hours in the laboratory. Found him with a rising temperature, took another specimen and found organisms.

Dr. Jackson (closes discussion).—I am glad my reference to quinine prophylaxis served to bring these gentlemen to their feet. I was referring to the prophylactic use of quinine at this particular place where it had been used for two or three years ineffectually. Not under my direction, for I was not there, but I have no doubt just as judiciously as I would have used it. I do not by any means condemn quinine prophylaxis utterly, but believe that it should not be substituted for mosquito work. As to the results at Camp Stotsenberg, cited by Dr. Craig, I simply call attention to the fact that last year the malaria rate there was again the highest in the army. I believe that where a certain procedure can be carried out effectively by the same people, year after year, results may be expected, but that anti-mosquito work is far more effective. The principal objection I have to its widespread, indiscriminate use is that it undoubtedly vitiates blood diagnosis. You cannot get away from that. Under those conditions you may frequently be badly put about for diagnosis when the quinine taken has been sufficient to drive the parasite from the peripheral circulation.

So far as the treatment is concerned, I do not think that any of us are in a position to lay down dogmatically the length of time over which medicine

shall be given but I think we often make the period too short. I have little fear of the drug quinine. I think we can use it without fear of injury over a long period of time. I think usually our treatment period is too brief. It is not resumed and our blood searches are not kept up and that is the reason why we have recurrences year after year. I think the only guide we have is the repeated examination of the blood.

MALARIA AS IT CONCERNS THE GENERAL PRACTITIONER.

By ESTILL D. HOLLAND, M.D.,
Hot Springs Ark

There is no object to be gained in a paper of this kind by delving into the classical literature of malaria. The discovery of its relation to the anopheles mosquito, with its explanation and control, forms one of the brightest pages of medical history. The Panama canal is more a triumph of medical investigation, heroism and self-sacrifice than it is of engineering. Engineers could have been found fifty years ago capable of overcoming the mechanical difficulties of building such a canal, but the pest-laden swamps of Panama formed a barrier that was not to be conquered by engineering skill alone.

It was only after the most absolute proof that physicians could be persuaded that malaria was due to mosquito inoculation, and even after this was proven without a doubt, a great many refused to concede that this was the only method of infection and still looked upon fogs and bad air with suspicion.

The seeming inconsistency of infection by the mosquito is best demonstrated by the cases of malaria we encounter where there is no history of mosquito bite and where the patients have lived in a locality supposedly free from the malarial mosquito for years, or for a lifetime, with no malarial exacerbations that they have known of until suddenly, after an injury, or an attack of indigestion or some acute disease, they will develop malaria so that the plasmodia can be seen in the peripheral circulation. Here there has very likely been no possibility of a recent mosquito bite, as the patient may be in a cold country where the snow has been on the ground for months, and as we know the life cycle of each plasmodium and its approximate period of incubation, it is impossible that these patients should have a new infection from this source.

I think that as the microscope becomes less of an ornament and more of an assistant in doctors' offices that the geographical location of malaria will change until it will be much easier to remember the points where one need not look for malaria, than it will be to remember the malarial districts, and the immunity of the inhabitants of such localities will be confined to those who have never left their immediate neighborhood.

No first-class physician professes to practice medicine these days without a thorough urinalysis in most of his cases, but one is surprised by the number of physicians who overlook the examination of the blood for malaria. A blood examination for malaria is much easier, quicker and cleaner to make than a urinalysis, and while the examination of the majority of urines does not tell one anything except that the patient's urine is normal, the majority of blood examinations do give one some valuable pointers.

If I had to guess at either the condition of the kidneys or the blood, I would much prefer to guess about the kidneys, as the other symptoms connected with their pathological condition are more reliable.

I examine the blood of every patient for malaria and it may be surprising when I say that I find more parasites of malaria in the people from the so-called non-malarial states than I do in those from the extreme south. This is easily accounted for by the fact that the people down south are constantly thinking

of and looking for malaria and take quinine for every disorder they may have. Consequently most southern people have eliminated the malarial factor before they go to a doctor, and are almost certain to have treated themselves or to have been treated by their home physician for it before they go to a health resort.

Northerners and easterners, however, seem to think that it is impossible for them to have malaria, and are made to feel more secure of their immunity by their home physician.

I think that a great many of the protracted minor ills, feelings of lassitude, and fevers following shock and minor injuries, are caused by an exacerbation of an old or a recent malarial infection. This can be best demonstrated by stating two typical cases, as follows:

Mr. V., age 38, Omaha, Neb. Patient had syphilis twelve years ago, took treatment for five months and had no more trouble until November, 1911, when he had a paralytic stroke followed by a hemiplegia. Patient was put on specific treatment and at the end of two months was able to leave the hospital. I saw patient March the 6th, 1912, when he was able to walk nearly normally, but still complained of a numbness in his right leg and foot, and said he had been having some fever every day since his stroke. I examined patient's blood and found a slightly positive Noguchi reaction and a great many malaria plasmodia of the chronic form. I immediately started him on large doses of quinine and his fever stopped within forty-eight hours and has not returned. Patient now, March the 20th, weighs eight pounds more than when he arrived, has a good appetite and is feeling better every way. I can find no plasmodia in his blood and intend to give him "606" in a few days for his syphilitic condition. It is not possible that this patient had a new infection in November.

Mr. Mc., age 30. Has lived in Hot Springs, Ark., all his life. Patient is never troubled with malaria unless he catches cold or has some minor complaint, after which I can nearly always demonstrate the plasmodia in his blood. This patient will only take treatment when he feels bad, so that I have never had an opportunity to really cure him of his predominating disease, although I can eliminate the plasmodia from the peripherial circulation in a day or two. This patient has been under my care, off and on, for three years and he often has these attacks in the middle of the winter when there have been no mosquitoes for several months. I have never been able to demonstrate the malaria plasmodia in his blood except after he has taken cold, had an attack of acute gastritis (to which he is subject), or is very much run down from overwork. I think this patient has a dormant malaria which is held in check as long as his vitality is unimpaired, but as soon as his resistance is lessened the malaria is able to manifest itself.

We are constantly getting patients who are suffering from a breakdown, nervous exhaustion, malnutrition and neurasthenia, in whom we can find no marked abnormality except that their blood shows malaria, and quinine and the baths is all it takes to make these people feel as well as ever in a comparatively short time. These patients usually give a history of having had some acute trouble in the past from which they never seemed to entirely recover, while most of them have been under the care of good doctors, very few of them have ever had a blood examination for the malaria plasmodia.

I will give one example that I am treating here now.

Mr. W., age 48, school teacher in Cincinnati. Patient had been working hard correcting examination papers, about six months ago, and began to have dizzy sensations. This dizziness increased until he was unable to walk at times, and he often could not lie down at night on account of vertigo. Patient was treated for high blood pressure and neurasthenia, but continued to get worse until he had to ask to be relieved from his duties at school. He was sent to New York City and

examined and treated without any beneficial results, and was finally advised to go south during the cold weather. Patient went to Houston, Texas, in January, 1912, where he was examined by an internist, who found a slight subacidity and started treating him for that. Patient remained in Texas for three weeks and finding very little, if any, improvement, he came to Hot Springs with a letter to me. The physician who had previously had this patient had made a very thorough examination of him, and the patient brought me a complete set of laboratory reports, consisting of three full urinalyses, two complete stomach analyses and three blood pressures. I was impressed on looking over these reports by their approximate normality. The urine only showing increased uric acid and phosphates, which could both be accounted for by the nervous condition of the patient, the stomach contents showing free hydrochloric acid 20, which, while a little low, is certainly not diagnostic, and the blood pressure in the last report was 140 MM., which did not seem to me to account for the patient's symptoms, which were still very annoying. I verified all these findings, getting about the same results, but I went further and examined this papatient's blood for malaria, *a thing which he had never had done before.* Patient's blood showed great numbers of malaria plasmodia. I put this patient on hypodermics of "Quinine and Urea Hydrochloride," giving him twenty grains at an injection and injecting him every day for the first three doses, and every other day for three more doses. Patient did not complain of the quinine to amount to anything and after the second injection he sat up half the night reading a book, a thing which he had not been able to do for six months. He is not bothered at all with vertigo, has no trouble sleeping, has a good appetite and is now anxious to get back to work, as he feels perfectly fit. This patient has been here for two weeks now and has not taken a thing but quinine and the baths.

It is hard to understand how a physician as modern and conscientious as the one in Texas seemed to be could overlook the examination of the blood for malaria, but he was evidently misled by this patient having come from Cincinnati, and he had made a geographical elimination.

I do not think that the majority of the people who are treated in the so-called non-malarial districts for malaria are cured, but that their symptoms are eliminated and the malaria decreased until their natural resistance is able to hold it in abeyance.

My reasons for this opinion are as follows: I used to examine a patient's blood the first day he came to my office, and would often find no trace of malaria, and the patient would give no symptoms to indicate that he had it; however, after four or five baths, this same patient might begin having fever and feeling much worse than he did when he arrived, and on making a second examination of his blood I would find a great many plasmodia. Now, most of our practice is during the winter months, when there are no mosquitoes, so that the possibility of a new infection was eliminated and there was no explanation except that the patient had an acute exacerbation of an old infection, caused by the baths having aroused the circulation until the blood cells containing the dormant malaria plasmodia were thrown into the general stream. This explanation seems logical to me as one of the principal objects of hydrotherapy is to increase the *whole* circulation and cause *all* the blood to be aerated, a thing which does not happen to the blood under ordinary conditions among people who lead an indoor life.

In other words, these baths have the same effect on people suffering from dormant malaria that some acute disease or injury may have, with this exception, that where the exacerbations of malaria from the baths is caused by a stimulation and increased distribution of the blood, that caused from shock

or acute disease is more from a decreased resistance.

Consequently the patient is in much better condition to overcome malaria after the baths than he is after disease or shock.

We treated five people here from Canada at one time last winter who were suffering from malaria, and in whom it was no trouble to demonstrate the plasmodia after they had taken a few baths. These people could not have had a new infection, for they were from a cold country where there had been no mosquitoes for months, and they arrived here when we were having freezing weather every night. We never see a mosquito here after November.

Malaria is associated with chills and fever in the minds of most people and a great many physicians, but the great majority of our malaria patients do not have chills, and many have not had one for years unless it was in connection with some other disease. Waiting for a chill before suspecting or diagnosing malaria is about as sensible as waiting for a hemorrhage before diagnosing pulmonary tuberculosis, or ascites before suspecting cirrhosis of the liver. These are all good signs when they happen, but after they have happened it doesn't take a doctor to tell what is the trouble. And if a physician allowed a patient to develop a hemorrhage or ascites without ever having suspected his condition he should feel very guilty.

I could go on giving histories indefinitely, almost, as we find that nearly half the people we treat here have malaria in some form, and I would like to emphasize the fact that the majority of our patients are chronic, although they are suffering from a multiplicity of diseases, but I have preferred to give a few cases at length rather than more cases abbreviated. The cases that I have cited are not the exception; they are the rule.

A great many physicians feel that when they have given their malarial patients enough quinine to make their heads roar that they have conquered the disease, but I have found by experience that this is not so. There is a great difference in patients' susceptibility to the toxic properties of quinine. One man will feel the disagreeable effects from five grains as much as another man the same size will from fifteen grains, and besides this, people establish an immunity to quinine and seem to educate their malaria plasmodia to do likewise. The man whose head roars from five grains of quinine, and who can only take a few grains a day, is not nearly as apt to recover from his malaria as the man who can take three times as much.

Also, some people do not seem to digest the plasmodia toxic properties of the quinine, but do digest the individual toxic properties. Such people have all the disagreeable symptoms of having taken quinine, but the plasmodia are as plentiful as ever. There is a common statement in most text-books that the malaria plasmodia disappear in the peripheral circulation after a few doses of quinine, but I find this to be an exception here, possibly because our cases are chronic. I often have no trouble in demonstrating the malaria plasmodia in a drop of blood from a patient's ear after he has taken fifteen or twenty grains of quinine a day for three or four days. We sometimes have patients in whom I cannot eliminate the plasmodia, no matter how long I give them twenty grains of quinine a day by mouth, but I have never seen a patient who would not respond to hypodermics of quinine in sufficient quantities. One should never give less than ten grains with a hypodermic and the effect of twenty grains will be much more gratifying in most cases. Dormant malaria is a serious disease which not only manifests itself at irregular periods, but complicates any other disorder one may have, and it is certainly worthy of spending three days in conquering, even if one doesn't feel very well while taking the treatment.

A patient with malaria should be given fifteen or twenty grains of the "quinine hydrochloridum" a day in conjunction with iron

and arsenic, and if at the end of three days the plasmodia are still demonstrable in the peripheral circulation he should be started on the hypodermics of quinine.

I think the reason that more physicians do not examine the blood for malaria is because they associate such an examination with a great deal of detail and bother, when in reality it is the quickest, easiest and most universally helpful laboratory adjunct to the general practitioner. A blood count takes time and is some trouble, but it is surprising how much one can learn about the blood from a quick smear that only takes five minutes. I will give my routine method for examining the blood of every patient that comes into our offices.

Prick patient's ear and let two drops of blood run out on towel, place slide to third drop of blood and smear blood over slide with piece of paper. Let slide dry, which takes about a minute, and then cover it with the stain (eosinate of methylene blue) and let stain for two minutes. Wash stain off in tap water, blot slide dry and put under microscope.

This slide will then show whether there are any plasmodia, and of what variety, the size and regularity of the blood cells and the approximate proportions of leukocytes to erythrocytes. One can also get a good idea of the color index and of the differential leukocyte count, and as one becomes familiar with these examinations it is surprising how reliable his conclusions will be.

If doctors will only use their microscopes they will be surprised at the number of complicated and obscure diagnoses which can be spelled *m-a-l-a-r-i-a*.

FEVER—MALARIA—QUININE

By ALBERT HAND, M.D.,
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In communities heavily infected many fevers without evident pathologic basis are called malarial, and because quinine is harmless and often potent, a thoughtless routine usually dictates its administration. A patient has fever; therefore he has malaria; therefore he needs quinine. And the epigram of Legrand—that "Fever=Malaria=Quinine" is still a satire on most Southern practitioners.

I have no reference to cases where, in honest doubt, we give quinine in hope of controlling the fever; I have no reference to the current method of fooling the patient and covering our ignorance with the use of the term malaria. But many deceive themselves by thinking a variety of fevers are malarial, and rest content with the routine quinine. If the patient promptly recovers, they feel that their diagnosis has been confirmed by the therapeutic test and that they have cured the disease, forgetting that the natural tendency of disease is to spontaneous recovery, and that possibly treatment has not in the least influenced its course.

In our sections most acute febrile attacks are malarial. But in making routine blood examinations I have found many cases in which malaria was diagnosed by exclusion where no plasmodia could be found. These cases were given quinine and promptly recovered. Lately I have noticed many of these cases recover just as promptly and completely when no quinine was given.

Case—M. Mc, female, colored, 9; acute febrile attack June 12; temperature, 103; physical examination negative; profuse sweat in two hours. Blood showed no plasmodium. Diagnosed malaria by exclusion. Gave Hg and left prescription for quinine. The prescription was never filled. The Hg. acted well

and the patient has since been symptomatically cured.

I do not believe this was malarial; yet, had she received the quinine, I would have considered that the quinine effected the cure. Such a case is but one of many, typical of recovery without treatment, and one cannot help wondering just how many of those who did get the prescription for quinine filled, just how many would have fared as well without as with the drug.

I believe we have been making a scapegoat of the term Malaria in diagnosis. Most fevers get quinine; if recovery follows in four days, we diagnose malaria; if it lasts longer, we find another term for the disease. In common practice malaria may be defined as any fever without gross pathologic basis that recovers in three days under quinine treatment. Such a slipshod method is scarcely above that of diagnosing disease from the symptomatology of patent medicine.

As to the taunt that malaria equals quinine, that we pass the term "malaria" through our consciousness and mechanically write down "Quinine; 48 grains in 48 hours," like an automatic delivery from a nickel-in-the-slot. With this formula, set and indiscriminately, the laiety treat malaria as well, as scientifically and with equally as good results as the physician. It is true that complete recovery often follows, thanks to Nature, from whom both physician and layman attempt to steal the honor of cure. The majority of patients are cured after one drachm of quinine; recover, not because the quinine has killed the malaria, but because the drug has inhibited for a time asexual reproduction and given the body resistance an opportunity to handle the infection. For one drachm of quinine will not cure, often will not drive the sexual forms from even the peripheral circulation. And sexual forms are always present with the same constacny as the infectiveness of the patient, and, when present, are always a menace, for I believe parthenogenesis is the rule rather than the exception. These sexual forms, the transmissible forms, the cycle of the seventh-day advent, of chronic malaria, not affected by quinine, are sometimes overpowered by vital resistance and the malaria is cured; sometimes they remain in the blood for long periods, a latent source of constant danger of fresh outbreak to the patient, and a source of constant infection to every anopheles that bites this malaria-carrier.

There is no specific against these sexual forms. Yet their eradication, the treatment of these malaria-carriers, is of vital importance. I do not believe the profession has erred in placing quinine in the hands of the laiety, but they have erred in setting an example and in not correcting the current notion that when the chills are broken the fever is cured. We have stocked the country with chill tonic; we have also stocked the country with chronic malaria. And we not only permit, but we have taught these malaria-carriers to go untreated, to infect, to strew the seeds of disease broadcast in the community.

I do not intend to discuss the different treatments. Two are prominent—the saturation with quinine every seventh day, the fractional sterilization of the blood, killing the asexually produced asexual forms once a week, and trusting the sexual forms to be exhausted and overpowered by the vital body resistance; and the second method of arsenic for one month. Personally, I use both, believing as long as there is a tendency for seventh-day recurrences the patient is a source of infection, and believing the arsenic acts solely as an alterative, a tonic, strengthening the body to fight the infection.

I do not advocate withholding quinine until the diagnosis of malaria has been confirmed. Its administration will do harm less often than its withholding. But we need an honest doubt whether many of our so-called malarial cases are really malaria. And we need more often to remember that in true malaria the patient recovers oftener than he is cured; that

forty-eight hours' quinine will not kill the sexual parasites; that these sexual forms are the source of infection and the source of relapse; that people harboring these sexual parasites are malaria-carriers, a menace to the community, and thorough, prolonged treatment of every case of true malarial fever is of paramount importance.

TUBERCULOSIS AMONGST THE UNITED STATES TROOPS SERVING IN THE TROPICS.*

By ISAAC W. BREWER, M.D.,
Ithaca, N. Y.

The dangers to which our troops serving in the tropics are exposed should interest us all. Especially should we be interested in the sickness caused by preventable diseases.

In a communication to the Far Eastern Association of Tropical Medicine, presented at its first meeting, (1) it was shown that tuberculosis was the greatest cause of death in the Philippines. That paper was based upon the mortality statistics for the City of Manila. Later, in a paper printed in the Boston Medical and Surgical Journal (2), the morbidity from tuberculosis amongst the native troops was discussed, and it was shown that they suffered greatly from tuberculosis, and that the incidence amongst them was nearly twice as great as amongst the native troops of the Indian army.

Recently an examination of the statistics of the army with this subject in mind has been made, and the result of this examination is here presented. These statistics will be of interest because they not only show the effect of tropical service in the Philippines upon the sickness from tuberculosis, but also reliable data upon the morbidity of tuberculosis in our army. However, in interpreting these data it is to be remembered that the army is composed of men who have passed a rigid physical examination, and that they live under better sanitary conditions than do most of the Americans in the Philippines. They are also better clothed and fed.

Table showing the admissions to sick report per thousand because of pulmonary tuberculosis amongst the troops of the United States army:

Year.	Total army.	Army serving in the United States, excluding Alaska.	American troops serving in the Philippine Islands, excluding scouts.	White troops in the Philippines.	Colored troops in the Philippines.	Philippine scouts.	Porto Rico regiment in Porto Rico.
1902...	4.38	....	....	....	....	4.87	....
1903...	3.89	....	....	....	....	7.16	....
1904...	4.26	3.94	5.08	....	....	7.38	5.55
1905...	4.22	4.09	5.16	....	....	5.49	....
1906...	4.50	4.51	4.77	4.68	6.36	8.62	3.90
1907...	4.50	4.44	5.81	6.29	3.25	4.27	3.34
1908...	3.81	3.35	5.76	5.56	6.64	6.10	2.60
1909...	4.00	3.96	5.06	4.71	4.31	5.77	2.40
1910...	3.12	2.82	4.81	4.81	none in P. I.	2.95	....

The admissions for the army do not show any progressive change for the better until the year 1910, and the great fall in that year may be a coincidence.

The rate of admission in the Philippines was always higher than in the United States, and the fall from 1909 to 1910 is by no means as great. If the campaign against tuberculosis is reflected in the admissions in the army in the United States, it cannot be claimed that such is the case amongst the white troops in the Philippines.

The data regarding the native troops (Philippine Scouts) is most interesting. The rate was in excess of that for the white troops in

*Read by title at the Ninth Annual Meeting of the American Society of Tropical Medicine held in Atlantic City, N. J., June 3, 1912.

the Philippines for every year excepting 1907 and 1910. The rate of fall from 1909 to 1910 is more than twice that for the troops in the United States. Whether this is due to more careful living or an accident is difficult to determine, but it is believed to be due to the former. In recent years, especially since 1909, the scout officers have been very active in preventing beri-beri amongst their companies. This resulted in improving the sanitary conditions of their camps and of the houses where the married men live. The amount of rice in the ration was reduced and beans and peas substituted. This surely has improved the resistance of the scout and without doubt has had much to do with preventing tuberculosis.

The rates for the colored troops in the Philippines and for the Porto Rico regiment are introduced as a matter of interest. They are not strictly comparable for the number of troops is so small that an admission here or there would greatly change the rates.

In considering conditions in the Philippines we naturally turn to the Canal Zone to learn what is being done there. I have therefore presented the following table of deaths from tuberculosis in Manila and the Canal Zone.

Death rate per thousand from pulmonary tuberculosis:

Year	Canal Zone	Manila
1906	3.82	5.17
1907	2.89	4.68
1908	2.56	4.25
1909	2.07	4.30
1910	2.17	4.37

This table shows very clearly the difference in the results obtained by the method followed on the Isthmus and those obtained in Manila. In the latter place the problem has been so great and the resources so small that better results could not be expected. A half-hearted campaign against the disease was begun in the summer of 1910. It has resulted in the establishment of a sanatorium near Manila and a few dispensaries. However, greater activity has been reported of late, and if the campaign be pushed with vigor there is no reason why a marked reduction in the death rate from tuberculosis should not be reported within a few years.

The climate of the Philippines is not very pleasant, and most of the Americans who are there charge all their ills to that score. Some maintain that it is the light that does the damage, while others deny that light has anything to do with it. There is very little scientific data presented by either side, and such as it is seems to be open to objections that may affect the results. Personally I do not think that the climate has much to do with tuberculosis. Very few of the native cattle or hogs are infected with the disease, probably because they live in the open.

The soldier is not over-exposed to the tropical light. He drills and works in the early morning or late in the afternoon, and spends most of the rest of the day hours in the shaded barracks. During a considerable portion of the year cloudy weather prevails.

It is believed that much of the tuberculosis reported amongst the soldiers in the Philippine Islands is due to his habits and to spending his leisure in badly ventilated and unclean native houses.

The statistics presented show that the soldiers who are stationed in the tropics are more liable to tuberculosis than are those who are stationed in the United States. This should be recognized not only by the slight increase in pay allowed for tropical service, but also by exercising greater care in selecting men for that service and in taking greater precautions to prevent infection.

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THE ASSOCIATION OF KIDNEY INFECTION WITH CHRONIC INFECTION OF THE APPENDIX AND LARGE BOWEL. A SUGGESTION.*

By ESPY M. WILLIAMS,
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This idea is the outcome of the observation by my co-workers, Dr. Wm. D. Roussel, and myself of a few cases of infection of the kidney, and, so far as we are able to ascertain, is original with us. It may be stated at the outset that the offering is made as a suggestion only, with the hope that others in the possession of greater facilities may take hold on it and find more proof either for or against it than can be adduced from the small number of cases which we have at hand now. The last word has not been said as to the etiology of infections of the kidney, and we believe that this may help in throwing a little more light on this most interesting question.

All of the cases which we can report are instances of infection of the kidney pelvis only, without evidences of involvement of the essential structure, and without complication locally except in one in which peri-renal infection was present. We omit details.

Case 1.—A right-sided pyelitis had existed for several years. It was treated medically with improvement, but relapsed from time to time. Upon carefully going over the history, previous attacks of appendix colic were found to have existed. The appendix was removed, together with a small pericaecal membrane, and a short course of urotropin resulted in what is, apparently, a permanent cure. One fecal concretion was contained within the lumen of the appendix.

Case 2.—Had symptoms of perirenal infection of four weeks' standing and was very ill when she was sent to us. She had had a few small furuncles on the face and neck two and a half months prior to the onset of this infection. The pus cavity was drained with alleviation of her septic symptoms, but there remained an irregularly elevated temperature with occasional pain in the region of the right kidney and frequency of urination, after the abscess had healed. The urine had been examined frequently for pus, since we believed that the perirenal suppuration was probably succedent to pyelitis rather than to the furuncles; but all examinations were negative until several weeks had elapsed, when pus was discovered in small quantity in the bladder urine during a routine examination. This led to immediate catheterization of the ureters, when the urine coming from the right kidney was found to contain a considerable quantity of pus, together with some colon bacilli. Unfortunately no culture had been made of the pus evacuated from the perirenal abscess. We can, therefore, not say positively that the infection was not due to the furunculosis, though we consider this hardly possible since a long time had elapsed since she had had the boils. Also, perirenal infection follows rather frequently upon infection of the kidney. A strange feature in this case is the fact that after the passage of the ureteral catheter her symptoms gradually subsided, and she has been well since then. This patient has symptoms of possible ptosis of the caecum, together with its associated lesions; she is constipated and has had mild attacks of tenesmus with mucous stools for several years. No operation upon the abdomen has been done.

Case 3.—Male, had had attacks of renal hematuria for five years, with pus urine and fever. The attacks of pain from which he suffered we could not in any way differentiate clinically from kidney stone. Radiograph showed no stone, but revealed a right kidney somewhat enlarged. He had had twelve years before the onset of his symptoms a very severe attack of acute dysentery assuming later a

* Read before the Southern Medical Association at Hattiesburg, Miss., Nov. 10-12, 1911.

chronic form, and since then he has been constipated habitually, having from time to time symptoms of a mild dysenteric sort. We had him under observation for a long time and there were certain points suggesting rather strongly an involvement of the appendix. The appendix was removed, bands of adhesions cleared from around the caput and end of ileum, and under a short course of medical treatment he recovered and has been well since. This case was operated on two years ago, and prior to that time his attacks had taken place at intervals never longer than of a month.

Case 4.—Is that of a young woman with distinct symptoms of right pyelitis which were proven by the usual methods. There were also symptoms suggesting membranous pericolitis, which had existed for seven years. A large pericolic membrane involving the caput and the whole ascending colon was found and removed. The appendix was not involved in the membrane, but was also removed.

Case 5.—Occurred in a young married woman who had had an attack of acute catarrhal dysentery three years before, and had suffered since with frequent attacks of tenesmus with mucus stools, and what seemed to be appendix colic. She had recently had a very violent seizure of acute right kidney infection, during which she was gravely ill for four days, after which the acute symptoms passed off. We removed a Jackson's membrane involving the ascending colon and the upper half of the caecum. The appendix was also taken off.

Case 6—Occurred in a young woman in whom the diagnosis of chronic appendicitis had been made two years before by another surgeon and the appendix and left ovary removed. Her symptoms were somewhat relieved for a short time, but returned later. She was constipated; had attacks of tenesmus with mucous stools from time to time; had pain in the left kidney region and bladder; symptoms which her family physician had treated as for cystitis. The urine contained pus and colon bacilli. She had not been catheterized after her operation, and her kidney symptoms were subsequent to that time. The abdomen was opened, a pericolic membrane removed from the caecum and ascending colon, a sharp downward kink at the extremity of the ileum relieved, and the lower part of the descending colon and upper third of the sigmoid freed from adhesions which had rolled the gut outward and fixed it loosely to the left parietes. Under proper treatment the kidney symptoms have entirely subsided, and the abdominal symptoms likewise have disappeared.

Case 7—This case is now under observation for the purpose of seeing what the medical treatment will accomplish. The patient is a married woman with several children, who has had her trouble for twelve years and has "gone the rounds" without relief. She complains of the usual symptoms of pyelitis, and the urine from the left kidney contains pus and colon bacilli. She is also very constipated, has attacks from time to time of mild mucous colitis, suffers with soreness and distention in the right lower quadrant. This case was seen only two weeks ago for the first time and has not yet returned. If the treatment she is now taking gives no good result, we will relieve the intra-abdominal trouble and wash out the left kidney pelvis.

Based upon the almost universally accepted fact that kidney infection by ascent through the urinary tract rarely takes place except in the presence of some obstruction to the outflow of urine acting as a predisposing factor, and that hematogenous infections are now believed to be by far the most frequent, and also that the colon bacillus is the organism most frequently found in kidney infections, we will, for the sake of brevity, sum up our offering thus:

(1) That the pyelitis and bacilluria so frequently met with in infants and young children is not an ascending infection; that it

is not due, as has been supposed, to uncleanliness in management of the patient during entero-colitis, but is rather the result of a hematogenous infection which is caused primarily by an inflammatory lesion of the bowel mucous membrane which permits the migration of bacteria into the blood. This tendency of bacteria to work their way into the intestinal structures when an atrium of inflammatory desquamation or ulceration is made for them is well known.

(2) That it will perhaps be found that a very considerable number of instances of infection of the kidney occur in subjects who are chronically constipated; who have attacks of appendix colic in which concretions are found within the appendix; who have a membranous pericolitis, chronic diverticulitis, or, in brief, any obstinate intestinal lesion which favors stasis of the fecal current, minute abrasions or ulcerative lesions of its mucous membrane and migration of bacteria into the blood stream. The possibility of migration of bacteria directly through membranous and pseudo-membranous formations surrounding the bowels, has been clearly demonstrated.

(3) It is quite within the limits of possibilities that some cases of primary tuberculosis of the kidney may be due to the same cause. Especially is this an interesting chance since the intestinal tract has recently commanded considerable respect as an etiological factor in tuberculosis elsewhere.

(4) Lastly, we submit that as a first cause may always be expected to act, even after the removal of its symptoms, it is wise to look closely into cases of relapsing infection of the kidney, with the possibility in mind of a large intestine lesion, which should be eradicated if found, thus lessening the chances of further difficulty.

DISCUSSION.

Dr. Smythe, Memphis: I just want to say a word on the question of diagnosis and the importance of the X-ray and urethral catheter in all cases presenting symptoms of renal calculus. It is not possible in all cases to arrive at a correct diagnosis from the subjective symptoms and a physical examination of the patient.

A case in point. Patient was seized with sudden pain, violent, persistent, with frequent exascerbation, profuse perspiration, nausea, quick, feeble pulse. Pain limited to right side and along the course of ureter. Examination of urine revealed presence of blood — microscopic. Treatment for forty-eight hours, morphine, chloroform, for the purpose of relieving the pain. I saw the patient on the morning of the third day. She had peritonitis—general. Digital examination revealed a mass supposedly exudate, on right side, occupying more than half of right side. Immediate operation was advised. Upon opening the abdomen a considerable quantity of fluid was found; general peritonitis observed. A cystic tumor, very dark, that had ruptured, was detected. It was a cyst of the right ovary with torsion of pedicle.

So, in cases of females seized with sudden and severe pain in right side we have to consider gall bladder, appendix, kidney stone, and ovarian cyst with torsion of pedicle in arriving at a diagnosis. The doctor covers all the other points of special interest in his paper.

FORBIDDEN FOOD FOR THE EPILEPTIC.

By HANSELL CRENSHAW, M.D.,

Neurologist to the Hospital for Nervous Diseases, Atlanta; Neurologist to the Wesley Memorial Hospital; Professor of Physiology in the Southern College of Pharmacy, Atlanta, Ga.

The frequency of epileptic seizures may be lessened by exclusion of certain common articles of food from the diet of epileptics. This statement, however, applies to genuine epileptic attacks rather than to epileptiform fits. Too often, I fear, we are prone to neglect the prescribing of diet for our epileptic patients and to fall back weakly upon the bromides as the only means of palliating the terrors of grand mal. As a matter of fact, proper food and right living are, in the long run, more productive of good for the epileptic than

the bromides or any other drug, though, alas! the salts of bromide may rarely, if ever, be dispensed with altogether.

Epileptics should eat little, if any, meat. This fact was strikingly brought out by Robert Koleman Kemp in an experiment upon 200 epileptics then under his care at the Manhattan State Hospital for the Insane. For three weeks he ordered a strict and light vegetable regimen for these patients. During that period not one convulsion occurred in the epileptic ward. At the end of the three weeks, however, Kemp ordered a full meat dinner all around. What was the result? Approximately one hundred of the inmates of the ward were seized with convulsions before night! In this instance another factor besides the meat was operative—namely, over-indulgence in food. The peripheral irritation incident to overloading the stomach is often enough to precipitate a convulsion. But the rich protein character of the meat was considered to be the chief irritant and spastic.

A case recently referred to me by Dr. Geo. M. Niles, of Atlanta, strengthens still further the case against over-indulgence in meat. The patient, a young man of neurotic temperament, began to have epileptic seizures shortly after entering upon the ministry. Naturally a generous eater, he fell an easy victim to the gastronomic allurements of his hospitable parishioners. Despite a careful course of bromides, he continued to have convulsions at intervals of a few weeks until he was removed from the gustatory gamut which his pastoral duties imposed each week. Several months ago he was banished to a farm and put upon a strict diet of low protein percentage. A recent letter states that thus far he has escaped seizures altogether.

Of the dietetic handling of epileptics, Osler has said: "The important point is to give the patient light diet at fixed hours, and on no account to permit overloading of the stomach. Meat should not be given more than once a day. There are cases in which much animal food seems injurious. A strict vegetable diet has been warmly recommended. The patient should not go to sleep until the completion of gastric digestion."

Tea, coffee and all caffein-bearing beverages, of course, are positively contraindicated. Indeed, all condiments and beverages of stimulating nature are antagonistic to the bromides, and, therefore, conducive to seizures. Especially is this true of alcoholic beverages.

It has been found that common salt is bad for epileptics. Richet and Toulouse were the first to call attention to this curious fact. They found that epileptics get along on less bromides if fed on a practically salt-free diet. Moreover, aside from the reduction of bromides, the withdrawal of sodium chloride from the food of victims of epilepsy seems to reduce the number and severity of attacks. An absolutely salt-free regimen is not practicable in all cases, because some individuals fail physically if deprived too severely of their salt. Yet, even in these cases, it is helpful to reduce the percentage of salt consumed.

To recapitulate, then, let the epileptic taboo red meat, coffee, tea, etc., alcohol in any form, common salt, and over-indulgence in the great game of gastronomics.

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ULCERO-MEMBRANOUS OR VINCENT'S ANGINA

By ELMER S. TENNEY,
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That the pathological condition now fairly well known as Vincent's Angina is not particularly uncommon is being shown by the frequency with which cases are being reported in the journals during the last year or two.

The reason for the more frequent recognition of this form of inflammation, which was first described as a definite pathological entity by Vincent (1) in 1896, is probably due to a clearer understanding of the means necessary for making the microscopical diagnosis which in all cases must be by staining a smear preparation made directly from the pseudo-membrane or from the free surface of the ulcer.

The fact that a smear preparation is of comparatively little value, and therefore seldom made, where diphtheria is suspected, and that a blood serum culture is of such great value under the same conditions, has resulted in the latter becoming about the only laboratory means of diagnosis employed in throat inflammations.

It is quite possible that the recent extensive study of the treponema pallidum (in throat cases) has resulted in the discovery of not a few cases of this condition.

In the course of a year's residence at one of the largest contagious hospitals in America (the South Department of the Boston City Hospital), at a period before any work upon Vincent's organisms had been done in the United States, I am confident that some of the cases admitted to the isolation wards, and which afterwards gave only negative cultures for K. L., were none other that what we now know as Vincent's Angina.

Since first seeing these organisms and the cases from which they came, I have, on several occasions, made a diagnosis of this condition from the mere clinical appearance of the membranes and tonsils and afterward found the organisms in great abundance.

The organisms which are supposed to be the cause of this form of tonsilitis, are the fusiform bacillus and the spirochaeta of Vincent, the former does not grow in the presence of oxygen (hence the fact that blood serum cultures never show it), but does grow quite readily under anaerobic conditions on certain media; while the spirochaeta of Vincent has not, so far as I am aware, been grown on artificial medium.

Whether the bacillus fusiformis and the spirochaeta vincenti are different forms of the same organism has been frequently questioned, but most observers believe them to be two distinct and separate organisms.

There has also been much discussion as to whether the condition in question is due to one or the other or to both conjointly; while a few maintain that the presence of these organisms has nothing to do with the lesion.

From the study of a considerable number of these cases during the past two years, it appears that Vincent's Angina is an ulcero-membranous inflammation commonly affecting the tonsils, but which may affect the buccal mucosa as well.

There is more or less sloughing, the ulcer being covered by a whitish or greyish pseudo-membrane the removal of which reveals a bleeding surface upon which the membrane soon reforms. In some cases the ulcer is superficial, in others, as in two of mine, it extends deeply into the tonsil and may destroy nearly its whole substance.

There may or may not be fever, but usually not over 38 C., slight malaise and some pain upon swallowing. Frequently these will be the only symptoms, but occasionally one of these cases will exhibit very severe symptoms re-

sembling noma, if indeed noma is not a more severe form of the other and existing in a person, usually a child, already greatly debilitated by some other disease.

It must be remembered that in noma these same two organisms are present, and usually in great numbers, appearing, as in Vincent's Angina, in nearly pure culture in the early course of the disease, but later becoming contaminated by other organisms.

The writer has seen six cases of noma in small children (following measles), all of whom showed these two organisms in abundance in all parts of the necrotic area. These were all severe cases and all died.

Concerning noma, Rosenberger (2), in reporting seven cases, says, "It seems to the writer that the affection known as noma is due to a symbosis of a number of bacteria, the principal ones of which are the symbotic organisms of Vincent.

"The reasons advanced for this supposition are that the disease is first evidenced by a membranous or ulcerative process; that in this stage the fusiform bacillus and the spirillum of Vincent are present in great numbers; later, as the process goes on to gangrene, other organisms, like the diphtheria organism, streptococci, or other microorganisms, make their appearance, and the disease goes on to a fatal termination.

"These facts are borne out by the study of these cases and the bacteriological findings."

The opinions expressed by Rosenberger as to the causation of noma seem to be well founded and reasonable. An angina develops in which the organisms of Vincent are present in great numbers, if the patient is robust and has been in good health a moderate inflammation results which tends to subside spontaneously, and this case should be diagnosed as one of Vincent's Angina; on the other hand, if this inflammation develops in a prson who is already greatly debilitated by previous disease, as for example in a very young child (who has probably also come from the slums and has never been well nourished) after a severe attack of scarlet fever or measles, a severe inflammation results which soon becomes invaded by the more virulent pyogenic bacteria and, as Rosenberger says, "the process goes on to gangrene," here you have a case of noma.

Much has recently been written upon the subject of Vincent's Angina, and the following review of opinions of a few of the more recent writers is not presented as being in any sense complete or nearly so. It represents merely what the writer has come across in the ordinary course of medical reading, without any effort to investigate the literature upon this subject.

In reporting "two cases of Vincent's Angina and one of noma, in which the organisms characteristic of the former affection were found," Rosenberger (3) describes the fusiform bacillus as "arranged in pairs, end to end; a clear, circular space separating the organism." These separated ends were more or less sharply cut, while the opposite poles were distinctly pointed.

Inoculations on various culture media were negative for spirillae and bacilli, but he got a vigorous growth of streptococcus pyogenes. The duration of the disease was from a few days to a few weeks. He says spirillae are not frequently found in the sputum. He considers Vincent's Angina as a distinct clinical entity due to the infection resulting from the presence of the fusiform bacillus and the spirillum of Vincent.

Herman (4) believes the fusiform bacillus and the spirochaeta of Vincent to be different forms of the same organism.

Weaver and Tunnicheffe (5) quotes Perthes in stating that the spirillae are the terminal enlargements or stages in the development of the fusiform bacillus.

Royer (6) says enough work has been done to justify our accepting these organisms as the probable cause of all membranous, ulcerous and gangrenous lesions of the mucous

membrane and of the skin in which this group of bacteria is found constantly associated. He reports the case of a young woman admitted to the hospital after premature labor, with a follicular tonsillitis, great prostration, heavily coated tongue, foul breath and with strips of pultaceous looking pseudo-membrane on each cheek and under the tongue.

Both tonsils were well covered with an exudate of a greyish white color. When the membrane was removed areas of beginning gangrene of the mucous membrane were to be seen.

Smears and cultures were negative during the first four days, after which the cultures showed K. L., and after one week smears from the throat showed numerous fusiform bacilli and spirillae.

Marked gangrene occurred on both sides of the inferior surface of the tongue and on the buccal mucus membranes and tonsils. All the teeth loosened rapidly and were extracted. and the thermo cautery used on all necrotic areas, but little improvement followed, sloughing continued beyond points cauterized. Lungs showed impaired resonance. Death followed after seventeen days.

Royer would have this called "malignant membranous angina," or "Vincent's Angina." He thinks that possibly this was a secondary infection of diphtheria.

Wingrave (7) says fusiform bacilli and the spirochaetae of Vincent are present in the majority of throat smears (acute and chronic). Second. They are also present in 80 per cent of normal mouths. Third. They are of frequent occurrence in the discharges from the nose and its accessory sinuses, the antro-tympanic cavity, etc. Fourth. They are equally numerous in conditions attended by decomposition and fetor (chronic states).

The cases of acute angina were always associated with either streptococcus, pneumococcus, diphtheria or stapholococcus, and to these exciting causes are to be attributed the conditions rather than to the bacillus fusiformis.

Clarke (8) reports the case of a sailor who had had enlarged glands for three weeks, difficulty in swallowing for four days, slight malaise, and very slight elevation of temperature.

The tonsils were both enlarged and on the left was a pseudo-membranous patch the size of an almond, which was greenish yellow in color, and when removed left a bleeding ulcer.

The treatment was removal of the membrane and the application of nitric acid (c. p.) once daily for two days (after using the above the mouth was immediately rinsed with water).

Potassium chlorate was given three times a day in three-grain doses.

Arnold (9) says that Vincent has described two clinical types, one much like diphtheria and another which he called "ulcero-membranous." Some of these cases strongly resemble the throats of scarletina, the majority, however, seem to be indistinguishable from what are usually called "septic throats."

A third form is described which closely resembles a syphilitic ulceration.

Fraley (10) reports nine cases of Vincent's Angina occurring during a quarantine for diphtheria in an institution, all children, all mild.

Rothwell (11) reports two cases of Vincent's Angina of bronchial type, which showed no throat symptoms, but in which breathing and cough resembled asthma, there was constant coughing with profuse bloody fluid sputum, there was no evidence of lung consolidation, the sputum was loaded with Vincent's organisms.

Conditions were unusually slow, lasting over six weeks. The use of iodine and the iodides in the nebulized form seemed to be of great help for both.

MacWhinnie (12) has this to say about the bacillus fusiforms and the spirillum. Plaut first described these organisms in 1894. The

bacillus varies from ten to twelve microns in length, being occasionally as short as six, and is usually, but not constantly associated with a fine spirillum.

A good description of the shape of the bacillus is that of a canoe, with the transverse markings somewhat resembling the seats in the canoe. The spirillum which accompanied this bacillus is extremely thin, long and in hanging drops is seen to be motile. It is a saprophyte of the buccal cavity, but becomes pathogenic in the presence of other organisms.

Several of his patients showed marked prostration out of all proportion to the clinical manifestations of the throat, and in all a marked aenemia was present. He treats by eneucleation of the tonsils and paints with full strength of the tincture of iodine.

Kolle and Hechth, in their Bacteriology of Infectious Diseases, quote several authors, but largely from Muhlens.

They give the bacillus as from 6 to 12 microns long by from .6 to .8 wide. Only the fusiform bacillus will grow on artificial medium, best at 37 C, and under strictly anaerobic conditions on acitic serum, human blood agar and egg medium.

Stab cultures give good results, yellowish white colonies not large, and foul smelling. Animal inoculations show nothing. These organisms are often found on the margins of the gums in nearly pure culture.

From a perusal of the above opinions it is at once apparent that all do not think the same concerning these organisms, but that the majority, and more especially those writing recently believe that, under certain conditions at least, they are in some way responsible for the pathological conditions above mentioned.

So far as the clinical appearances and symptoms are concerned, I think Clarke's case as described above is about a typical one of the milder form. I will briefly outline but one of my own. The case of a man, about 25 years old, in good physical condition, admitted to the hospital for inguinal adenitis; two weeks later complained of a sore throat.

The tonsils were rather congested, darker than normal and slightly swollen; the right showed a deep "punched out" ulcer with necrotic edges, cavity was about 1 c. m. in diameter and half as deep and partly closed by a dirty yellowish membrane.

On the left tonsil were seen three small yellowish white patches of membrane. When tonsil was rubbed with a piece of gauze the membrane could be partly removed, leaving a bleeding surface. Smears from this showed large numbers of fusiform bacilli and many spirochaetae of Vincent, also a few other organisms normally present in the mouth. Smears made from the ulcers later in the case showed fewer of the organisms of Vincent and great numbers of other organisms, such as would ordinarily be seen in a smear made from a case of acute tonsilitis. At no period in this case was there any fever and the throat was not particularly sore.

The treatment consisted in the frequent use of an alkaline mouth wash and daily applications of tincture of iodine. At the end of two weeks the ulcers had entirely healed.

I have had quite a number of cases of which the above is a fair sample, some have been treated as above and one or two have received no treatment except a mouth wash, and these seeemd to recover as quickly as the rest. When the case is not a severe one, therefore, it seems that the condition subsides whether treated or not.

I have found these organisms in several cases of gingivitis. I am not sure, but I think in every case in which I have looked for them, quite commonly in cases of follicular tonsillitis, in tonsillitis of a more serious form in which there was more or less sloughing, in several cases of syphilitic sore throat, in the pus expectorated from a case of abscess of the lung, and in the cases of noma above mentioned. For the privilege of seeing the latter cases I am indebted to Dr. Place, of the South Department of the Boston City Hospital.

That these organisms are present in 80 per cent of *normal* mouths, as is claimed by Wingrave, I can hardly believe, but that they are very frequently present in mouths containing decayed teeth and soft, spongy gums, I feel sure. However, these I do not consider as normal mouths. That they are always associated with some of the other pathogenic microorganisms commonly present in the mouth is also undoubtedly true, for these latter organisms are nearly always to be found, but to prove Wingrave's contention true one needs to find the pathologic conditions known as Vincent's Angina and either not find Vicent's organisms or else find them in moderate numbers as might be done from a case of gingivitis or from a spongy soft gum showing hardly any inflammation, instead of finding them as will usually be the case in Vincent's Angina in enormous numbers and in almost pure cultures early in the case.

If these organisms are not the cause of this condition they at least increase most decidedly during its development.

If Vincent's Angina and noma are not the same thing, there are at least several very striking points of similarity between them, and to me the assumption seems plausible that the latter is a case of the former, in a weak and debilitated subject, plus an invasion by one of the more virulent pyogenic organisms a gangrene resulting under these conditions. While these organisms may perhaps be considered as saprophytes under ordinary circumstances, in symbiosis with other and more virulent organisms they appear to become pathogenic and to aid in the production of very serious conditions.

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8. United States Naval Medical Bulletin, January, 1909.
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PISTOL BALL PENETRATION OF THE LEFT VENTRICULAR CAVITY, WITHOUT HEMORRHAGE, WITH REMARKS ON TREATMENT OF HEART WOUNDS.*

By HERMANN B. GESSNER, M.D.,
New Orleans, La.

Henry R., colored, male, 24 years of age, laborer by occupation, was wounded with a 32-calibre revolver on the morning of December 7, 1910. The bullet came from a distance of about five feet and entered the left side of the chest between the fourth and fifth ribs, at a point about one inch to the left of the nipple; there was no wound of exit.

On the following day, December 8, the wounded man was brought to the Charity Hospital, where he was admitted to my service in ward 25.

Examination by the interne, Mr. H. E. Nelson (to whom I am indebted for notes of the case), showed the above-mentioned wound, which was cleansed and sealed with collodion. The chest presented on the left side dullness on percussion, diminished expansion, in-

*Read before the Section on Surgery of the Southern Medical Association, Hattiesburg, Miss., Nov. 10-12, 1911.

creased voice sounds and bronchial breathing, especially over the lower areas. The treatment was by the usual stimulating means, together with morphine for pain.

When I first saw the patient on December 12, five days after the injury, his condition was very grave. In addition to the physical signs noted above, which we took to denote hemothorax and pneumonia, he had a pulse of 150, respirations, 60, and temperature varying between 103 and 105 degrees F. His history and the situation of the wound suggesting the likelihood of heart injury, I exam-

a. Site of Bullet. ab ab¹ Divided Track of Bullet.

ined this organ and found, both on palpation and on ausculation, a feeble action, with remote beat and sounds. Suspecting the presence of blood in the pericardium, I introduced a fine trochar and cannula between the fifth and six costal cartilages on the left, less than one-half an inch from the sternum, to the depth of about one inch. No fluid came through the cannula.

Nothing further was done for the patient, who died at 9 p. m. of that day. At 6 p. m. of the following day an autopsy was held by Mr. Nelson in the presence of Dr. A. A. Aucoin, coroner of Assumption Parish. It was found that the ball had perforated the lower lobe of the left lung, grazed the dome of the diaphragm, entered the pericardium and penetrated the heart, passing obliquely through the lower portion of the left ventricle from the lateral aspect, and lodging in the apex, at which point it was found encapsulated. There was no blood in the pericardium. The heart wound had healed. Lobar pneumonia and hemothorax were found. The trochar puncture in the pericardium was identified; the heart was intact opposite this point. The obliquity of the bullet track, paralleling many of the ventricular fibres, explains the absence of hemorrhage.

Dr. Irving Hardesty, Professor of Anatomy in Tulane University, upon request, gave me the following references on the musculature of the heart, in which is well described and clearly illustrated the course of the fibres in the ventricles whose interlacing in whorls explains the closure of the tract behind the bullet:

McCallum, J. B.—On the Muscular Architecture and Growth of the Ventricles of the Heart. (Welch Festschrift, 1900.)

Mall, F. P.—On the Muscular Architecture of the Ventricles of the Heart. (Am. Jl. of Anatomy, March, 1911, p. 211.)

The technique of treatment of suspected heart wounds may be stated as follows: Rehn resects the sixth left costal cartillage, through this wound explores the pericardium without injury to the pleura, and establishes or excludes the fact of cardiac injury. If injury has been found, the Spangaro incision is employed, laying wide open the fifth left interspace, including the pleura. Respiration is kept up by means of an intratracheal catheter, through which an air-ether mixture is pumped (Meltzer-Auer).

The venae cavae are grasped for short periods, while fine silk sutures are introduced

short of the endocardium and tied in diastole. Drainage is usually employed.

COMMENT.

I have reported this case for the purpose of encouraging operative interference in suspected heart wounds. Between the case of heart injury that dies at once and that in which the injury does not threaten life lie a long range of cases of moderate injury, calling for operative help and affording ample time for rendering it. The study of the favorable cases must stimulate surgeons to attempt to give relief where indicated.

SUPRAPUBIC VERSUS PERINEAL PROSTATECTOMY.

By JOHN M. WILSON, M.D.,
Mobile, Ala.

In reviewing a number of prostatectomies, both suprapubic and perineal, performed by myself in the past four years, and comparing the results, I have been convinced that the suprapubic route is by far the most practical. It has been my experience that better results are in the majority of cases obtained by this method of procedure.

I believe that this is the safer operation of the two for several reasons. It affords much better drainage, and then, too, the operator is enabled to bring the gland better into view before clipping its capsule.

The operation I usually employ is as follows: The symphysis is shaved and prepared as for laparotomy. An incision about three inches long is made in the median line just above the symphysis down to the prevesical space, which is readily recognized by a plexus of veins which should be pushed aside. The peritoneum, of course, is to be pushed back and not injured. The bladder is then opened and washed out with hot boric solution.

A piece of sterile gauze is placed in the fundus of the bladder by means of a large retractor placed against it, and the bladder pulled upwards. The capsule of the prostate gland can then be brought into view. It is incised with a sharp pair of scissors sufficient to introduce the finger and is then enucleated.

In some cases I find it of advantage to have an assistant insert a finger in the rectum and push the gland upward. Of course, where infection is present, suprapubic drainage of the bladder is advisable, together with urinary antiseptics for several days previous to the radical operation.

In those cases where hemorrhage into the bladder occurs with threatening symptoms due to great hypertrophy of the gland, I do not hesitate to perform the radical operation without delay, but, of course, all patients should have the proper preparatory treatment when possible.

A drainage tube is inserted into the bladder, which is closed with fine sterile catgut.

In cases where post-operative hemorrhage is threatening I pack the prostate bed with a strip of sterile gauze, to be removed in twenty-four to forty-eight hours.

I have, with few exceptions, used ether as an anaesthetic, and feel that it is preferable to chloroform when no kidney complications exist.

BOOKS RECEIVED FROM LEA & FEBIGER, New York and Philadelphia.

Archinard's Bacteriology, Second Edition.
Guenther's Physiology, Second Edition.
Browning & McKenzie on Syphilis.
Thornton's Formulary.

The above mentioned books will be examined and reviewed for the convenience of our readers.

SOME OBSERVATIONS ON PELLAGRA AS IT EXISTS IN ALABAMA.*

By M. B. CAMERON, M.D.,
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Since Searcy, in 1908, first graphically called the attention of the medical profession to the existence of pellagra in Alabama, the disease has been gradually spreading, until in 1910 and 1911 it reached the proportion of an epidemic, and will this summer (1912) become one of the most important public health questions that will confront the people.

First being recognized in the Mt. Vernon Insane Hospital, the disease has steadily extended its ravages until it has reached every county in the State, and has exacted a death toll of nearly 1,000 lives in this State during the year 1911. If every death from pellagra in Alabama during this year had been published in the daily press as they occurred, there would have been a panic in the State before the year was half spent that would have almost paralyzed business, and a sentiment crystallized with sufficient strength to have forced some kind of an investigation of the origin, control and cure of such a deadly malady.

It is my purpose in this article, in a modest way, to call the attention of the profession to the condition that confronts them, and to appeal to them to try to devise some plans that will arrest the deadly rush of such a plague.

Until 1910 I had never seen a case of this disease in my practice, but since that time I have treated twelve cases, ten of which occurred during 1911.

Some authorities hold that the disease has been in the state probably twenty-five years, but has remained unrecognized until recently. I think this suggestion is erroneous, because a case of pellagra in the last stages presents a picture so striking, so clear cut, and so revolting in its appearance that the impression on the memory could never be effaced. In retracing my professional experiences for the past twenty-five years there is no picture in my memory that simulates a well-developed case of pellagra. Lavinder (1) says, "It is hardly credible that it could have existed unrecognized in any thing like the number of cases found in 1907 and subseqeunt years," and it will readily occur to us that the fact that Searcy and Babcock both recognized it almost simultaneously working independently, proves conclusively that the profession was alive and equipped for the prompt recognition of the disease. With the lights before us we are warranted in the conclusion that this disease did not prevail in Alabama to any extent prior to the year 1907, and since that time it has gradually increased in violence until 1911 it had spread to such an extent over the State as to attract the attention of the daily press, which through their editorial columns called on the State Health Department for an investigation of the disease. The same condition exists in most all the South Atlantic and Gulf States, and public sentiment was so strong in Tennessee that the State Board of Health undertook a thorough investigation, with the result that 58 of the 64 counties visited were found to have the infection.

With the object of ascertaining the extent of the disease in Alabama, I prepared and sent to 200 physicians in the State, selecting them from different localities in each county, the following inquiries:

1. How many cases of pellagra prevailed in your county during 1911?

2. How many deaths from pellagra during 1911?

3. How many cases of the disease have you known to be cured?

4. How many times did more than one case occur in same house?

*Read before the Medical Association of the State of Alabama, Birmingham, Ala., April 16-19, 1912.

5. What is your opinion as to the cause of the disease?

6. Briefly describe your method of treatment.

7. What action, from a public health standpoint, should be taken for its eradication and prevention?

The result of these inquiries from each county in the State is hereby appended in tabulated form, and reveals the fact that the disease exists in every county It is interesting to note that there were three points in the State, widely separated, where the disease was reported to prevail in epidemic form. Dr. J. W. Boggess reports ten cases on Sand Mountain, in Jackson County, occurring in close relationship to each other, which assumed an epidemic character. Dr. H. L. Castleman, of Sylacauga, reports from 250 to 300 cases in Talladega County, and says that he anticipates very distressing conditions there during the coming summer. He frankly admits that some other physicians there do not agree with him as to the extent of the epidemic. Dr. R. L. Sutton, of Orrville, writes that at Rehoboth, or Catherine, in Wilcox County, there is a bad focus of infection accompanied by many deaths.

The report of the Trustees of Bryce Insane Hospital for the year ending September 30, 1911, says: "Pellagra seems to be increasing among the whites in Alabama. More than ever before we have admitted white pellagra patients in the last twelve months. None of the doctors, nurses or other employes have contracted pellagra in the hospitals." A table submitted in their report shows 206 patients with pellagra admitted from the various counties, and this number is not included in my tabulation.

I received about 100 replies to my letter and they show that nearly 2,000 cases of pellagra prevailed in the State during 1911, and I consider that this report is far from complete.

The reported fatalities from this disease, as shown in the table for 1910 and 1911, amounts to 1,061, over 700 of which occurred in the year 1911. This would indicate a death rate of 30 per cent. From Dr. H. G. Perry, State Register of Vital and Mortuary Statistics, I submit an interesting table of deaths occurring during 1910 and 1911 ,as reported to his department arranged as to color and sex This shows the great preponderance of the disease among females as noted frequently by writers, and which was a fact in my cases, nine out of twelve being females. The proportion in Dr. Perry's table being three females to one male. The most plausible reason why females are more subject to the disease in my mind is that they are exposed to the debilitating influences of child-bearing, lactation and menstrual disorders, which lowers their vitality and weakens their resistive forces.

Another interesting feature of this mortuary report for 1911 indicates that the disease is prevailing more among the whites than the negroes, as there was reported 239 deaths among the whites and 174 colored deaths. This report of 413 deaths from pellagra for 1911 would indicate that we really had 900, for as yet we are only collecting 45 per cent of our deaths.

In another table prepared for me by Dr. Perry the highest mortality seems to be during the months of July, August, September and October.

In order that you may have a bird's-eye view of the pellagra situation in Alabama I submit a map showing the topographical distribution of the disease by counties.

While the scope of this paper will not admit of an extended discussion of the aetiology, symptomatology and treatment of this disease, I wish, however, to discuss them in a limited way.

The true aetiology seems yet to be shrouded in mystery, and the laboratory and dead room have so far failed to throw any gleam of light that would obscure the brilliant observations of Lombroso, who "elaborated the idea, and by his writings and vigorous influence fixed

the impression in the medical and lay mind, that pellagra is a disease caused by the eating of spoiled corn" (2). Lavinder says, "the idea of some aetiological relations between maize and pellagra has long been accepted by the medical world, and is approved by the mature judgment and long labors of many experienced and able men. It is not, indeed, an established doctrine, but it is not in consonance with the conservatism which has usually characterized the medical profession totally to reject an accepted hypothesis unless it can be replaced by something much more tangible" (3).

I am not aware that any one contends that sound corn or pure corn products will cause pellagra any more than any one holds that the bite of an uninfected mosquito will convey malaria or yellow fever. There must be a condition of hyperacidity or dampness in the corn material that produces a mold, fungus or toxin, the gradual absorption of which produces the disease; and to my mind the amount of this poison absorbed within a given length of time explains the type of the disease, whether it pursues an acute or chronic course.

Studying the extensive spread of pellagra over Alabama during the last few years from a causative standpoint we have many substantial reasons to sustain the maize theory. Prior to 1905 the production of corn in this State was ample to supply the food needs of the inhabitants, and what was shipped in from the Western or Northern States was utilized for feeding stock. Indeed, it was a prevalent idea among the farmers and laborers that this imported corn was unfit for human food, and most every one reserved enough of native grown corn for table use. There was in most every community a grist mill where this corn, after being carefully selected, was taken and converted into meal under the owner's supervision, and he carried home meal that he knew was pure.

Since 1905 the corn production of this State has been yearly greatly reduced by droughts and the increased price of cotton causing a curtailment of the corn acreage. This has resulted in shipping into the State immense quantities of corn products for our consumption. For commercial and economical reasons this corn has been converted into meal either at the point of origin of shipment, or at some central city in the State acting as a distributing point. This has entirely eradicated the possibility of the consumer selecting a sound grain for his food, and has placed him at the mercy of a commercial product where no attention is paid to the character of grain converted into meal.

This condition will reach out into the years to come, for, although our State in the past two years has increased her yield of corn sufficient to supply the food demands of her people, we are without the means to convert this grain into meal owing to the abandonment of our grist mills during the non-production period. When these become re-established, and our corn production continues, we may expect a rapid abatement of the disease.

We should also consider that the system of harvesting corn in the great area of its production has entirely changed in the past ten years. Improved harvesting implements, coupled with the desire to utilize the stalk for shredding to be used as a forage, has induced the producer to cut and shock his corn in the stalk long before maturity. It is left in the shocks to dry out exposed to the vicissitudes of the weather, which often causes it to develop an acid condition or molding that should cause it to be condemned for food. Dr. Boggess, in reporting the epidemic prevailing last year on Sand Mountain, in Jackson County, states that "all these people buy largely meal ground in various parts of the country that is shipped in on the Tennessee River by boats that travel slowly and unload their cargoes at night, often in bad weather without any shelter." Cole (4), in his personal investigations in Italy, says that "the disease has been greatly modified wherever

BIRD'S-EYE VIEW OF PELLAGRA IN ALABAMA IN 1911.
By M. B. Cameron, M.D., Eutaw, Ala.

the Government has instituted strict inspection of maize products."

It is true that many persons with pellagra have said that no corn products formed any part of their diet, but it must not be forgotten that until the pure food and drug law of the Government was put in operation some three years ago that it was reported that the wheat millers used the cheaper corn products as an adulterant of flour, and it was easy for any one to be deceived as to what was the real composition of their food. The experiment of Bass (5), in producing the disease in a fowl fed on spoiled corn infected from cultures made from stools of pellagra patients, is an advance step in establishing the maize theory

In replying to my fifth question as to the cause of the disease, 75 per cent of the answers attribute it to corn, and a few curiously say that the disease is a form of syphilis or tuberculosis.

The next most prominent theory as to the cause of pellagra is that of Sambon, who contends that the disease is transmitted by the bite of a blood-sucking insect—simulium reptans—or buffalo gnat. The conditions necessary for the propagation of this insect is a running stream. Two of my cases occurred on the limestone hills in Sumter County, at least three miles from any running stream, and Beall (6), of Texas; Tucker (7), of Virginia, and Brownson (8) and many others, report many cases occurring remote from any running stream. Hunter (9), of Kansas, did some experimental work last year to establish the Sambon theory without success.

We are reminded that the buffalo gnat has been with us in the South since our civilization commenced, and we have only had pellagra with us for the past few years. If this theory was true, when one case occurred in a family it should be followed by others in the same house, while we see from the tabulated report by counties, out of a total of 1,683 cases, the second case in the same house has occurred only 48 times. This theory appeals to us only by its attractiveness.

The amebiasis and cotton seed oil theories may be mentioned only to be condemned. Lavinder (10) says such a hypothesis does not seem in harmony with many of the well-known facts of pellagra, and does not appear in accord with either its history, its epidemiology, or its clinical and pathological phenomena."

Symptomatology.

It is easy to make a diagnosis of this disease after the erythema has appeared, and when the gastro-intestinal disturbances are prominent, especially with psychic manifestations, consequently I do not deem it necessary to dwell upon these. I do wish to call attention to some symptoms that precede these for some time, which, if we heed, may enable us to steer our patient clear of the breakers ahead. Chief among these is a feeling of exhaustion and lassitude that are pre-eminently of a neurasthenic type. They have gastric disturbances of the neurotic element and complain of aches and pains that present no pathological explanation. Vaso motor disturbances are common in this stage, and we often find headaches and vertigo that are difficult to explain.

Among the female patients the incipient symptoms are often gynecological in character, with pains around the uterus and in the ovarian regions. Disturbances of menstruation occur in this pre-pellagrous state with a tendency to metrorrhagia, which curettment fails to relieve. It is well when a patient with these symptoms comes to you in the spring, and after a careful examination you find no definite cause for same, to be on your guard and institute management and treatment for pellagra.

Prognosis.

Notwithstanding Bass (11) says that the death rate from pellagra is not over 5 per cent in Louisiana, we fail to find such a low percentage anywhere else in the South. We cer-

tainly have a different condition in this State for the death rate in my own cases is 75 per cent, and I am expecting the few who went through the winter apparently cured to make my percentage reach the 100 mark before this summer is over. The death rate from the disease in the entire State for 1911 was around 70 per cent. Many cases apparently get well, but relapse in a year or two and go on rapidly to a fatal termination, and we should never consider a case cured until three summers have elapsed without a recurrence. The prognosis in the acute types of the disease is especially gloomy, while we are more hopeful for a cure in the chronic form. I have known cases to die in six weeks after the first symptoms were observed.

Treatment.

The drug that has attracted the most attention in the treatment of pellagra is arsenic, and the newer the preparation the more praise does it receive Atoxyl was the fad until salvarsan rose like a beaming star in the therapeutic sky to eclipse its glory. The new-born babe is being given credit for many wonderful cures of this disease, as well as some other minor troubles. I have run the entire gamut of drugs in the treatment of pellagra and I have yet to find one that is entirely satisfactory; in fact, I do not think there is any drug cure for the disease yet discovered. After the disease has become well established diet and hygienic management seem to accomplish as much as any line of drug treatment. The supreme treatment of pellagra is prevention. To accomplish this there should be a rigid inspection of all food supplies shipped into the State, especially corn products; and there should be a standard of purity established that would exclude all products of a questionable character.

It is useless to say that this step should not be taken until the corn theory is proven, for we, time and again, clogged the wheels of commerce upon an outbreak of yellow fever long before the true cause of the disease was known.

This inspection and power to exclude products should be directly in the hands of the medical profession of the State and not delegated to other departments like some other public health matters have been that rightly belong to us. A scientific commission should be appointed to thoroughly investigate the disease and to work out some method by which we can control or eradicate it from the State.

We are sleeping in Alabama from a public health standpoint while this pestilence is sweeping like a tempest unimpeded throughout the State.

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County	No. cases reported 1911	Total deaths 1910 and 1911	Cases reported cured	No. times more than one case occ'd in same house
Autauga	3	2	0	0
Baldwin	3	3	0	0
Barbour	0	1	0	0
Bibb	30 (a)	13	0	0
Blount	18	4	0	4
Bullock	2	5	0	0
Butler	40	15	0	3
Calhoun	20	15	0	0
Chambers	10 (a)	5	1	0
Cherokee	2	0	2	0
Chilton	0	6	0	0
Choctaw	18 (a)	13	0	0
Clarke	0	4	0	0
Clay	5	4	0	0
Cleburne	9	5	1	0
Coffee	5	4	0	0
Colbert	10	1	0	0
Conecuh	9 (a)	2	0	0
Coosa	10	6	0	1
Covington	10	5	0	1
Crenshaw	18 (a)	7	0	0
Cullman	30 (a)	12	0	0
Dale	11	7	2	0
Dallas	22	10	0	2
DeKalb	16 (a)	7	0	0

Elmore	9	7	1	2
Escambia	7	5	1	0
Etowah	25	13	3	3
Fayette	18 (a)	7	0	0
Franklin	15	9	0	0
Geneva	7	5	0	1
Greene	15	12	0	0
Hale	20	11	0	0
Henry	10	2	0	0
Houston	20	7	1	0
Jackson	20	4	2(ap'r'ly)	0
Jefferson	109	47	0	1
Lamar	15 (a)	4	0	0
Lauderdale	17 (a)	4	0	0
Lawrence	19	7	8	6
Lee	22	16	0	0
Limestone	12	7	0	0
Lowndes	10	2	1	0
Macon	35 (a)	20	0	0
Madison	40 (a)	20	0	0
Marengo	35	11	2	2
Marion	10	6	0	0
Marshall	20 (a)	8	6	1
Mobile	45	145 (*)	10	1
Monroe	12 (a)	3	0	0
Montgomery	30 (a)	90	0	0
Morgan	27	12	0	1
Perry	30	14	0	0
Pickens	30	12	4	0
Pike	35 (a)	12	0	0
Randolph	18 (a)	10	0	0
Russell	18	10	2	0
Shelby	18 (a)	10	0	0
St. Clair	15 (a)	7	0	0
Sumter	35	18	2	3
Talladega	250 (b)	18	0	10
Tallapoosa	42	20	0	1
Tuscaloosa	60	132 (c)	0	0
Walker	50 (a)	22	0	0
Washington	12	5	1	0
Wilcox	35 (a)	18	0	0
Winston	10	3	0	0
Total	1,683	951	44	48

(a) Estimated; (*) This includes mortuary record of Mt. Vernon Insane Hospital; (b) Dr. Castleman reports 250 to 300 others from 25 to 50; (c) One hundred and twelve of these deaths occurred in Bryce Insane Hospital.

DEATHS FROM PELLAGRA BY COLOR AND SEX, 1910-1911.

County	1910 White Male	1910 White Female	1910 Black Male	1910 Black Female	1910 Total	1911 White Male	1911 White Female	1911 Black Male	1911 Black Female	1911 Total
Autauga	..	..	..	..	..	..	..	..	1	1
Baldwin	..	..	..	3	3	..	..	..	..	..
Barbour	..	..	..	1	1	..	..	..	..	..
Bibb	1	5	..	1	7	1	3	1	1	6
Blount	2	..	..	..	2	1	1	..	..	2
Bullock	..	..	..	2	2	..	1	..	2	3
Butler	..	1	..	3	4	1	3	1	3	8
Calhoun	..	3	..	1	4	1	3	2	..	6
Chambers	..	..	..	..	..	..	1	..	..	1
Cherokee	..	..	..	..	..	..	..	..	..	..
Chilton	..	1	..	1	2	..	3	..	1	4
Choctaw	..	..	..	4	4	..	1	..	2	3
Clarke	..	..	..	..	..	..	2	..	2	4
Clay	..	2	..	..	2	..	1	..	..	1
Cleburne	..	..	..	..	..	..	4	..	..	4
Coffee	..	4	..	..	4	..	..	..	..	..
Colbert	..	..	..	..	..	..	1	..	..	1
Conecuh	..	1	..	..	1	..	..	..	..	..
Coosa	..	1	..	..	1	..	1	..	1	2
Covington	..	..	..	..	..	1	..	..	..	1
Crenshaw	..	1	..	..	1	..	1	..	1	2
Cullman	..	..	..	..	..	2	3	..	..	5
Dale	..	1	..	..	1	..	1	..	..	1
Dallas	1	3	..	..	4	..	1	1	5	7
DeKalb	..	..	..	..	..	..	3	..	..	3
Elmore	..	..	..	..	..	2	1	..	..	3
Escambia	..	1	..	..	2	..	2	..	..	2
Etowah	..	3	..	1	4	1	1	..	..	2
Fayette	..	1	..	..	1	..	2	..	..	2
Franklin	..	..	..	..	..	1	4	..	..	5
Geneva	..	..	..	..	..	..	1	..	..	1
Greene	..	1	1	4	6	..	..	..	3	3
Hale	..	..	..	2	2	1	..	..	4	5
Henry	..	..	..	..	..	..	..	..	..	..
Houston	..	..	..	1	1	..	1	1	..	2
Jefferson	4	9	2	5	20	7	8	4	8	27
Lamar	1	..	..	..	1	..	..	..	..	..
Lauderdale	..	..	..	..	..	..	..	..	..	..
Lawrence	..	1	..	..	1	..	1	1	..	2
Lee	..	2	..	1	3	2	4	3	..	9
Limestone	..	..	..	..	..	..	1	..	1	2
Lowndes	..	..	..	..	..	..	..	..	1	1
Macon	..	..	..	3	3	..	2	1	2	5
Madison	..	..	..	..	..	..	1	..	..	1
Marengo	..	1	3	2	6	..	..	..	4	4
Marion	..	2	..	..	2	..	1	..	..	1
Marshall	..	..	..	..	..	..	3	..	..	3
Mobile	2	3	24	38	67	6	7	23	42	78
Monroe	1	..	..	..	1	..	..	..	..	..
Montgom'y	3	7	4	2	16	3	3	3	20	29
Morgan	..	1	..	..	1	1	4	..	2	7
Perry	..	1	..	1	2	1	1	1	4	7
Pickens	..	..	..	1	1	..	2	..	..	2
Pike	..	1	1	..	2	..	2	1	1	4
Randolph	..	1	..	..	1	2	1	..	1	4
Russell	..	..	..	..	..	..	1	..	1	2
Shelby	..	2	..	1	3	..	..	..	2	2
St. Clair	..	2	..	..	2	1	..	..	..	1
Sumter	..	..	..	1	1	1	..	..	2	3
Talladega	..	2	..	..	2	3	5	1	1	10
Tallapoosa	9	15	..	..	24	31	66	..	2	99
Walker	..	4	..	1	5	..	3	1	2	6
Wash'gton	..	1	..	1	2	..	..	..	..	..
Wilcox	..	1	..	3	4	..	..	..	5	5
Total	25	88	35	86	234	71	168	45	129	413

Reported to Board of Health.

DEATHS FROM PELLAGRA BY MONTHS REPORTED TO STATE BOARD OF HEALTH, 1910 AND 1911.

	1910	1911
January	10	18
February	10	7
March	12	15
April	12	25
May	21	44

June	21	38	November	18	27
July	22	47	December	10	29
August	39	71			
September	29	42			
October	31	50	Total	235	413

FEEDING IN TYPHOID FEVER.*

By M. S. DAVIE, M. D.,
Dothan, Ala.

Coleman (1) believes "that the solution of the essential problems of the typhoid fever diet will be found in the correct answers to two questions: 1. Should the typhoid fever patient be given enough food to meet his energy requirements? 2. How much food may be considered necessary to fulfil these requirements?"

It is generally agreed now that the average demand of the normal organism is approximately thirty-three calories or heat units per kilo, or, since we are in the habit of calculating doses upon the basis of 150 pounds weight, a normal patient of this weight would need or oxidize 2,300 calories. Krehl (2) estimates an increase of 25 per cent to meet the energy requirements of the typhoid patient, and this estimate is in common acceptance. Therefore, we observe that the 150-pound typhoid patient demands 2,800 calories per twenty-four hours. This is his minimum requirement. Assuming that 2,800 calories is the minimum energy requirement of this patient, it is obvious that he must get it out of his diet or out of his warehoused energies.

Just here the question arises as to the ability of this patient to assimilate his energy requirement from any amount of intake, no matter how arranged as to concentration or digestive tax. This proposition is purely a matter of experience or test. Since the pathology of this disease has recently been rewritten, to the extent that it is now understood to be a bacillemia, with an incidental infiltration of certain portions of the small intestines, it is agreed that some of our conceptions of the intestinal possibilities of a full diet were largely imaginary. At the same time the proposition is absolute that this patient is in the midst of enormously devitalizing processes, no matter if this devitalization is construed to be a demand for more energy producing intake, and his ability to digest and appropriate nourishment may be definitely impaired.

The empiricists have been studying this feature of the situation with increasing vigor and boldness. Seventy years ago Graves showed temerity in asserting that these patients should be fed, and proceeded to give them a regime of broths and jellies which figured 300 calories. Thirty years later Flint announced that these patients were insufficiently nourished, and mapped out for them a milk campaign of two quarts a day, or approximately 1,400 calories. Twenty years later still a great many men began giving serious and more or less competent attention to diet in this disease, and now today Coleman says, "in one case we reached 100 calories per kilo or 6,000 calories a day." This paper of Coleman's is based upon an elaborate study of forty-six patients, only one of whom died, and which he thinks, for reasons given, "might, with fairness, be excluded." So there, on this high caloric regime, you have as low mortality as any one might dare to ask for.

As for the best arrangements for making up this caloric intake, that is largely a question of

*Read before the Medical Association of the State of Alabama, at the Birmingham meeting, April 15-19, 1912.

judgment, based upon individual considerations. It is more or less customary among the advocates of this regime to administer nourishment every two hours during the day, and every four hours during the night. Others prefer a three-hour daytime interval, and once or twice at night. I think the smaller quantities necessary at each feeding on the two and four-hour interval plan would be less likely to produce stomachic discomfort and restlessness.

As to the caloric value of the various food items, this is largely charted ground. By consulting any of the recent texts, and using a little ingenuity, it is an easy matter to construct a satisfactory dietetic outline for any given patient. However, as a working basis and for example I will list a few articles and their caloric values as selected from a recent article by Crohn (3):

Food Substance	Amount	Calories
Broth	Ounce 1	7
Bread	Ounce 1	75
Bread (without crust)	Gm. 20	50
Butter	Gm. 5	37
Bread and butter as used.	Slice 1	87
Buttermilk	Ounce 1	10.93
Cereal	Portion 1	160
Cream	Ounce 1	70
Cocoa	Ounce 1	22.50
Custard	Portion 1	60
Egg	1	60
Ice Cream	Plate 1	90
Lactose	Ounce 1	125
Milk	Ounce 1	20
Malted Milk	Ounce 1	15
Egg albumen	Eggs 1	40

Still quoting from Crohn, I will give you the outline of an average typhoid fever diet:

Breakfast, 6 a.m.: Farina 1 portion with lactose 1 ounce and cream 1 ounce. Coffee 6 ounces with cream 1 ounce and lactose ½ ounce.

8 a.m.: Hot milk 6 ounces with cream 1 ounce and lactose ½ ounce.

10 a.m.: Cocoa 8 ounces with cream 1 ounce and lactose ½ ounce. Bread and butter 1 slice.

Dinner, 12 m.: Broth 8 ounces, bread and butter (in form of milk toast) 1 slice of bread with milk 4 ounces and cream 1 ounce and lactose ½ ounce. Egg 1 (poached). Rice 1 portion with lactose 1 ounce and cream 1 ounce.

2 p.m.: Ice cream 1 portion, bread and butter 1 slice, milk 6 ounces with cream 1 ounce and lactose ½ ounce.

4 p.m.: Orangeade 8 ounces, with egg 1 and lactose ½ ounce.

Supper 6 p.m.: One of the wheat breakfast foods 1 portion, with cream 1 ounce and lactose 1 ounce, bread and butter 1 slice, egg 2—Feeding in Typhoid Fever

1, malted milk 2 ounces with milk 6 ounces, cream 1 ounce and lactose ½ ounce.

8 p.m.: Orangeade 6 ounces, with egg albumen 1 and lactose ½ ounce.

12 p.m.: Hot milk 6 ounces, with cream 1 ounce and lactose ½ ounce.

4 a.m.: Lemonade 6 ounces, with egg albumen 1 and lactose ½ ounce.

This gives you a twenty-four outline possessing a total value of 3,704 calories. The constituent makeup of most of these articles is as follows: (4)

	Protein %	Carbohydrate %	Fat %
Milk (by volume)	3.3	5	5
Cream (by volume)	2	3	30
Butter (by weight)	...	..	85
Toast	11	60	..
Eggs (selected to weigh 60 gm. gross)	12	9	..
Lactose	...	100	..

The energy value of these constituents is as follows: (5)

	Calories
1 gm. protein	4.1
1 gm. carbohydrate	4.1
1 gm. fat	9.3

In calculating the energy demand of the typhoid fever patient his oxidation processes should be considered. His condition on this point is found to be one of intensified protein catabolism. In fact, this is true of the febrile reaction of all acute infections. So. in taking care of the nutritive status of the typhoid patients, it becomes a question of conserving protein loss and supplying protein energy.

This loss of body protein hitherto observed is charged to pyrexia, toxemia and starvation. Pyrexia can be materially modified with water,

without any upsetment other than the increased energy demands of increased exercise and manipulation, and its demand is imperative. Starvation can be met by an enriched dietary. As stated, this toxic destruction or febrile catabolism is very largely a protein loss. Indeed, Krehl and others think it almost exclusively so, and the exigency is almost wholly one of protein conservation. At the same time it is unwise to make the protein content of the intake any higher than absolutely necessary, as all articles of diet rich in protein are the things most likely to provoke digestive disturbances. Then, too, protein alone must be given in prohibitive amounts before nitrogen equilibrium is approached. The organism can succesfully handle only about 100 gms. of protein a day, and it may better discharge its functions on 70 gms. a day. Fats alone hardly retard the protein loss at all. And they should always be administered cautiously, being kept down to the minimum upon the slightest evidences of digestive disturbances. So we are forced to place our chief reliance upon carbohydrates, and it happens, as Folin has shown, that their absorption in this disease is practically normal. Furthermore, experiment has proven that the checking of protein waste is best conserved by the liberal administration of carbohydrates. Carbohydrates alone may reduce the nitrogen output as much as 50 to 70 per cent.

A careful distinction should be kept between improperly nourishing and improperly feeding a patient. So far as at all consistent with the needs of the situation, the patient's appetite should be studied and his peculiarities noted, as digestion has its psychology, and will not tolerate a diet too distasteful. Yet there should be no mental tax upon the patient in the selection of his diet, and it should be changed as little as possible. His energy requirements having been agreed upon, an effort should be made in every instance to meet them, by carefully testing him out up to his full caloric demand, or until his digestion tolerance line is unmistakably reached. Where it is impractical to have an elaborate food chart, it is quite an easy matter to make up the demands of the patient from a combination of lactose, milk, cream and eggs.

"The dietary at St. Luke's Hospital contains on an average 63 ounces of milk to which 1 ounce of milk sugar is added to every 7 ounces, and 3 whole eggs a day. This diet contains 2,585 calories, about 1,000 less than Shaffer & Coleman's and about 85 gms. of protein." (6)

"The basis of the high caloric diet as used in the wards of the Bellevue Hospital is milk, cream, eggs, milk sugar, bread and butter. With such materials various combinations may be made; one and one-half quarts of milk will give 1,000 calories, a pint of cream 1,000, one-half pound of sugar about 1,000 more, four eggs 250 more, thus making 3,250 calories. If one wants a few calories more, 250 to 500 more can be gotten in two to five ounces of sugar added to lemonade." (7)

"A glass of milk that contains seven ounces of milk, one ounce of cream, and one ounce of milk sugar, offers about 325 calories. Eight such glasses in twenty-four hours will give 2,600 calories, as high as many care to go. The protein, as well as the calories, in this food must be remembered. The milk contains 35 gms. to the quart, and the cream a trifle less, 25 gms.; the eggs, 8 or 9 gms.; the bread about 9 per cent, or 45 gms. to the pound loaf. In the more liberal dietary just suggested, about 100 gms. are afforded; in the smaller, 70. Two eggs added to this would increase the protein to 85 gms." (8)

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1. J. A. M. A., Vol. LIII, No. 15.
2. Principles of Clinical Pathology, Philadelphia, 1905.
3. J. A. M. A., Vol. LVIII, No. 4.
4. Shaffer-Coleman, Archives Internal Medicine, Vol. IV, No. 6.
5. Ibidem.
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Next Meeting Jacksonville, Fla., November 12, 13, 14, 1912.

The Jacksonville Meeting

If present prospects are realized, the meeting of the Southern Medical Association at Jacksonville, Fla., November 12, 13 and 14, 1912, will be one of the most notable gatherings of medical men ever convened in the South. Conditions are ripe to insure a large and important convocation of physicians, not only from cities in the Southern States, but also from all the others, and from the islands and countries farther south. The prevalence, spread and persistence of pellagra, the ever-increasing interest in the study of malaria, and the alarming imminence of a pandemic of plague would in themselves be sufficient to insure a large and interesting meeting, but when to these opportunities for study and information are added the natural attractions of Jacksonville and the extensive preparations its physicians are mking to insure visiting doctors and their families a "good time," the combination is simply irresistible. Doctors should be sure to take their families with them to this meeting. It would be selfish not to share with them the many pleasant features planned for their delectation. Though no program has been finally fixed upon, it is known that the gentlemen in charge have under consideration a sumptuous banquet, an elegant reception, automobile rides and a boat ride on the lovely and romantic St. John's River. The hospitals and sanatoria will offer many interesting cases, medical and surgical, for observation and study, some of which will be explained by men of international fame. The Journal is proud of the growing influence and position of this Association. For nearly two years it has gladly assumed the labor and responsibility devolving upon it as the Official Organ.

The editors see in the increased strength and influence of the Southern Medical Association the fruition of a hope and an effort on

their part, a success, however, which they do not claim for themselves, but which was only made possible by the support of the many eminent authors who have allowed the Journal to publish their papers, and by the unselfish devotion of the men who have worked for the Association unceasingly since its inception.

Full details of the meeting, including the programs of the four sections, will be given in the October number of the Journal.

It is not too soon, however, to begin planning for a delightful trip to the "Land of Flowers." You cannot afford to miss the Jacksonville meeting.

National Association for the Study of Pellagra

On the 3d and 4th of next October the National Association for the Study of Pellagra will meet at Columbia, S. C., for the consideration of this important problem. A glance at the names of a number of the gentlemen who are scheduled to participate in this conference demonstrates the importance of the occasion.

They are as follows: J. F. Siler, United States Army; P. E. Garrison, United States Army; W. J. MacNeal, New York; C. H. Lavinder, U. S. P. H. and M. H. S.; R. M. Grimm, U. S. P. H. and M. H. S.; E. J. Watson, Columbia, S. C.; Allan H. Jennings and W. V. King, Bureau of Entomology, Washington, D. C.; Prof. G. Antonini, Milan, Italy; H. H. Hagan, Washington, D. C.; M. F. Engman and W. H. Moore, St. Louis, Mo.; E. J. Wood, Wilmington, N. C.; F. C. Curtis, Albany, N. Y.; K. H. Beall, Fort Worth, Tex.; Egenio Bravetta, Mombello, Italy; Herman M. Adler, Boston, Mass.; Ernest Cooper, Columbia, S. C.; C. W. G. Rohrer, Baltimore, Md.; A. E. Hirschfelder, Baltimore, Md.; Beverly R. Tucker, Richmond, Va.; C. C. Bass, New Orleans, La.; S. R. Roberts, Atlanta, Ga.; Robert Wilson, Jr., Charleston, S. C.; Eleanora B. Saunders, Columbia, S. C.; H. W. Rice, Columbia, S. C.; Bernard Wolfe, Atlanta, Ga.; G. C. Mizell, Atlanta, Ga.; Roy M. Von Wort, New Orleans, La.; S. F. Killingsworth, Columbia, S. C.; L. B. Meyers, Charlotte, N. C.; G. M. Niles, Atlanta, Ga.; J. Watson, Columbia, S. C.

Communications have been received from a large number of other gentlemen prominent in medicine and science, promising attendance and participation, several of them coming from countries across the sea where pellagra has long been known and studied. The enormous importance which pellagra has developed in this country during the last few years cannot be overestimated. When one considers that ten years ago the disease was scarcely heard of in America, while today it is present in almost every county of almost every state, one wonders with apprehension what will the conditions be ten years from now unless meanwhile the key to the mystery has been found. Such diseases extend their ravages with geometrical increase. Slow at first, pellagra did not make much impression upon the public mind, but now it has become a source of lively apprehension; and if its spread increases with the rapidity that seems to be indicated, it will in another decade have become a source of terror comparable only to that caused by plague or yellow fever, but with this difference—that whereas they were sharply localized, this may be universally diffused.

These words may sound like those of an alarmist, but the writer believes them justified by the situation. He recently saw a map of a Southern State containing over sixty counties, each of which was marked with dots representing by their number the prevalence of pellagra therein. Only two show entire absence of the disease, and from them no report had been received. When an imperfect survey reveals such a condition, it is time to be alarmed. In view of the foregoing, the importance of the approaching meeting at Columbia may be better estimated. In spite of the fact that the persistent efforts of the most

scientific men at home and abroad have thus far failed to formulate a theory of the etiology of the disease that is universally accepted, yet it seems incredible that, with the rapidly accumulating data and the ever-increasing facilities for investigation, we shall not ultimately discover the truth and with it means for successfully combating the elusive element that constitutes its hidden etiology. Hence no recent meeting of scientific men for the study of subjects pertaining to the public welfare has been of such importance as will be that at Columbia on the 3d and 4th of October next. The economic welfare, the happiness, the health and the very lives of thousands of our fellow-citizens will be affected by its deliberations.

For further information, letters of inquiry should be addressed to Dr. J. W. Babcock, Chairman of Committee of Arrangements, Columbia, S. C.

Stranger Than Fiction

The first article in the present number of the Journal deals with discoveries in the world of the minute so wonderful as to be almost incredible. In its plain and simple sentences Dr. Matas tells us of an advance in microscopy which he justly terms "ultramicroscopy," for it seems to extend the powers of that instrument far beyond their normal limits. He tells of a sublimated moving picture apparatus whereby photographs are taken as are those of our national pleasure shows, but whose objects were cast upon the sensitized films by illumination through a microscope, and are so magnified and clearly defined that the life history of disease germs appears in motion on the screen as plainly as do those of the domestic dramas daily shown in every city. The movements of the germs, their attacks upon the tissues, their flights and pursuits, their hiding behind an erythrocyte, their acts of sexual union—all these and many other actions of the minutest parasites, including the spirochaeta pallida, progress before the beholder's eye on the illuminated screen.

Such a consummation surpasses the wildest flights of the imagination of old-time physiologists and pathologists, and constitutes an immense step toward that final knowledge which, like the mathematical repetens, we shall forever seek, but never attain. It makes one proud to belong to a profession which has wrought such a miracle and is devoting its powers to the welfare of humanity. With such facilities for observation, it does seem that even the elusive germ of pellagra must at last yield its secrets and be overcome. To a physician it seems that the merits of this new advance almost equal in importance and value even the conquest of the air. And as one step always leads to another, we stand hopefully looking for still greater things to come. All honor to Pathe and his fellow-workers and disciples.

Recreation

There is a deep, true meaning in the above word when one separates the first syllable from the remainder. And properly employed, the hours devoted to that re-creation are more profitably spent than many that are more seriously filled with matters of business.

All over the country members of our profession are returning from their summer vacations and resuming their life's routine. Most of us feel renewed energy and courage to face the duties of the hour, a confidence in our ability and a readiness for work that reminds us of earlier years, when doubts and hesitation were unknown.

The springs of confident impulse respond again to the touch of opportunity. Something within us has been renewed or recreated by the weeks of freedom from responsibility, of new scenes and congenial diversions and companionships.

What is that something? Does it lurk in the leukocytes or the erythrocytes? Or is its secret hidden in the ultimate, squirming tendrils of the nervous system? Perhaps the peptic

glands are partly responsible. Who knows? But let no man despise his hours of recreation.

Rheumatism

Shakespeare says, "What's in a name? A rose by any other name would smell as sweet." This might be true of roses, but medical nomenclature is a very different matter. The misuse of the term "rheumatism" has worked an infinite amount of harm in various ways. Probably the two conditions which are most frequently erroneously called rheumatism are various forms of neuralgia and arthritis deformans.

Now to saturate a neuralgic patient, one with sciatica for instance, with the salicylates, is an insult to medical intelligence, ruinous to a much-needed digestion, and results in an inevitable failure injurious to reputation.

Many a case of arthritis deformans, which can no more be benefited by salicylic acid than could diphtheria be cured by quinine, is dosed with the nauseous drug in some form or other, year after year by successive doctors, all to no purpose.

Why do we thus perpetuate such an ancient error? We no longer try to "fence in" a spreading erysipelas with nitrate of silver demarkation, or to burn it out with iodine; partly because we know its etiology better and partly because experience demonstrates their uselessness. But though equally unsuccessful with salicylates in treating sciatica and arthritis deformans, we still repeat the error with a clear conscience. Why? The answer is plain. It is because these conditions are wrongly named. To most of us the word "rheumatic" at once suggests the salicylates, so that a disease called "sciatic rheumatism," or "rheumatoid arthritis," inevitably receives "anti-rheumatic" treatment. This is the physician's answer to Sheakespeare's question, "What's in a name?"

Few if any of our text-books now use the term "sciatic rheumatism," but they all link the idea of rheumatism with arthritis deformans, yet there is no evidence whatever of any connection between the two diseases, save sometimes by accidental concurrence. And though no reliable cure for it has yet been satisfactorily demonstrated, we can at least abstain from adding the misfortune of mistaken treatment to the fearful ills that are inevitable in such cases. Cut out the "rheumatoid" from our nomenclature. There is no excuse for it.

Trachoma, or Pink Eye.

The occasional prevalence of infectious "sore eyes" among children and teachers in public schools, and the serious consequences that too frequently result, has led to careful microscopical and clinical investigation in many instances.

The character of the inflammation and the absence of gonococci or other recognized pathogenic organisms, the extremely infectious nature of the disease, the prolific granulations of the lids, and the slow, obstinate course, declare the individuality of the affection. In country districts it is called "pink eye," but many physicians recognize it as the dreaded "trachoma," which the watchful guardians of our seaports are rigidly excluding when suffered by immigrants and seafarers.

Until recently no germ peculiar to trachoma had been isolated. During the past twelve months a group of men in the Research Laboratories of the New York Health Department have made an exhaustive bacteriological study of this disease. Large numbers were examined and cultures made in many different media. They found *in most cases* a very small, gram-negative, hemoglobin-o-philic bacillus. Curiously enough the investigations have not yet been able to discover any characteristic that will differentiate it from the bacillus of influenza. They also report that the growth of colonies of these tiny bacilli is promptly "inhibited by the presence of certain streptococci." This sounds like another instance of Physiologic Therapeutics.

Meanwhile it is well to remember that more-

than a year ago an Alabama doctor (C. M. Watson) reported treating many cases, pupils and teachers, with solutions of Epsom salts. About ten grains to the ounce of water for a collyrium, used with a dropper four times a day, and a cold compress of the same solution on lint for night or sleeping. "One swallow cannot make a summer," but there is a deal of unexpectedness in sulphate of magnesia.

THERAPEUTICS

EMETICS.

Emetics are agents which cause vomiting, or emesis.

The action requires a reversal of the peristaltic motion natural to the stomach. Indeed, if this reversal be too emphatic it sometimes extends further than the stomach and involves the small intestines, resulting in stercoraceous, or fecal vomiting.

Emetics are now seldom used, though many cases would be abbreviated by them, but in certain conditions, notably in poisoning, they are indispensable.

Emetics act in two entirely different ways, one class by local irritation or stimulation, the other by their influence upon the vomiting center in the brain. Finally some emetics act both centrally and locally.

After taking an efficient emetic the patient soon begins to feel restless, depressed and nauseated. The heart beats rapidly and feebly, and sometimes fainting seems imminent. The flow of saliva becomes very free and soon vomiting ensues. The contents of the stomach are forcibly ejected, the face is flushed and the temperature increased. After the stomach is emptied nausea still remains, if the drug was a local emetic, and subsides only gradually. Then the patient feels weak and relaxed, and any inclination of the system to spasmodic action is, for the time, overcome. A great many substances act as emetics when swallowed in doses sufficient to produce that effect, but only those that are practically employed for that purpose will be here considered.

Sulphate of zinc is one of the most prompt and sure of this class. The dose as an emetic is from 15 to 20 grains (1.0-1.29 gm.), dissolved in a half glass of water. Some authorities give from 10 to 60 grains as the emetic dose (0.6-4.0 gm.), but the latter is rather beyond the limits of safety, especially as in some cases of opium poisoning the stomach fails to respond to such stimuli.

ANTIMONII ET POTASII TARTRAS.

Antimony and potassium tartrate, tartar emetic, is generally found in a white, irregular powder, having its original crystals broken down by exposure to air. It is without odor and has a sweetish, nauseous taste.

It is soluble in 15½ parts of cold and in 3 of hot water, but not in alcohol. Externally applied in an ointment, it pustulates the skin in a manner similar to croton oil, and is sometimes used by malingerers simulating eruptive diseases. In large doses internally it is an irritant poison, causing burning pain in the oesophagus and stomach, violent and uncontrollable vomiting, great depression of pulse and profuse perspiration. This is accompanied by a choleraic diarrhoea.

Indeed, a person dying of tartar emetic poisoning shows all the symptoms of a fatal case of Asiatic cholera.

The remedy is tannic acid, then strong coffee, brandy, hypodermics of atropine and strychnine, and of camphorated oil.

As an emetic it is now seldom used, the dose, however, being from one to two grains (0.06-0.12 gm.) given in two doses fifteen minutes apart.

The Syrupus Scillae Compositus, Com-

pound Syrup of Squill, contains approximately one grain to the ounce, and is a useful addition to expectorant cough mixtures. It is not suitable for administration to very young children in any amounts whatever on account of its depressing effects.

IPECACUANHA.

Ipecac still remains the emetic most frequently used by the mouth, partly because of its safety and partly from the esteem for it inherited from our predecessors. Moreover, it possesses virtues in addition to its powers as an emetic that are very useful. Locally used the powder is irritating to the skin and mucous membranes, causing redness and pustulation if contact is long maintained. The dust rising from a jar of the powdered drug when opened in a large room can affect some people with symptoms resembling those of hay fever.

Its effect upon the stomach and intestines, when swallowed, depends upon the amount taken. In doses of fifteen grains (1.0 gm.), repeated in ten minutes, each dose washed down with a glass of tepid water, it acts as an efficient and safe emetic, though the slowness of its operation precludes its use in cases of poisoning, where instantaneous effects are desired. In doses of from ⅛ to ¼ of a grain (0.008-0.016 gm.) it acts as a tonic to the stomach and liver, increasing the appetite and digestion, and also the secretions of the small and large intestines On this account it is frequently prescribed along with cascara, alion and other laxatives to increase their efficiency.

One drop doses of the wine of ipecac have been used successfully to stop obstinate vomiting when other known means had failed.

In past centuries it was called "dysentery root," because of its power to control that disease.

It is best adapted to the treatment of bacillary forms of the disease which appear in epidemic form in tropical or sub-tropical climates. It is not generally considered useful in amoeboid dysentery.

The difficulty of having it retained by the stomach instead of acting as an emetic is overcome in several ways. Some claim that 15 grains (1.0 gm.) are generally retained if given in sweet milk, and that if the first dose should be rejected a second would not.

Another way is to render the stomach less sensitive by first giving 20 drops (1.29 cc.) of laudanum, and after fifteen minutes following it with three capsules each containing 5 grains (0.3 gm.) of the drug, taking with them as little fluid as possible. The same directions as before apply to a repetition if vomited. The procedure should be repeated in six hours unless satisfactory improvement is manifested.

This treatment is seldom needed in cases of the dysentery generally met with in this part of the country, it being merely a mucous diarrhoea yielding to local antiseptic treatment and sedatives.

Ipecac shows valuable results in the treatment of catarrhal diseases of the respiratory tract, especially with children. In the spasmodic croup so common among them in cool or damp weather it is a safe and prompt remedy, the strident cough softening as soon as slight nausea causes general relaxation. For this purpose the syrup, dose 3 to 15 drops (0.19 cc.-1.0 cc..), is used, or the wine of ipecac, dose the same

As a diaphoretic and at the same time an anodyne, the combination of powdered ipecac and powdered opium still holds its place in the esteem of the medical profession. It is prescribed under the name of Dovers powder, and contains one grain of ipecac and one of opium (0.06 gm.), in every ten grains of the mixture, the remainder being inert. Its dosage is governed by that of the opium and the age of the patient.

An active principle, emetine, seems to possess all the virtues of the crude drug save its astringency, which is due to tannic acid. In tablets or granules containing 1-6 of a grain

(0.01 gm.) it may be conveniently administered, each granule being equivalent to 1 grain (0.06 gm.) of good ipecac. In sufficient numbers they will cause emesis, while powdered and divided into six or eight parts each part can be given as a mild expectorant. A granule containing only 1-67 of a grain (0.001 gm.) is sometimes found in drug stores. It would seem that ipecacuanha should share the fate of cinchona, and be represented only by its alkaloid in modern practice. There seems no reason why it should not be used instead of the crude drug whenever its effects are needed.

THE TREATMENT OF NERVOUS NAUSEA.

When nausea is due to neurasthenia or anemia, says Aaron ("Diseases of the Stomach," Lea & Febiger, publishers, Philadelphia), these conditions should receive attention. Anemia may be improved; that is, hemoglobin can be rapidly increased by the hypodermic use of the citrate of iron, as described on page 240. Sometimes the food cure should be instituted in cases where the general nutrition is low. Patients occasionally do well when removed from their homes and customary surroundings. Particular attention should be paid to the mental state of the patient, which is often depressed. Severe cases should be treated in a properly conducted hospital or a sanitarium. Food should be served in an attractive manner, for the sake of its appetizing influence and the pleasure which details of this kind give the patient. Should there be nausea early in the morning it will be well to serve breakfast in bed. Hydrotherapeutics will be found a valuable factor in the treatment. Zweig, as a means of cutting short the attack of nausea, recommends a bath of 64 degrees F. or a cold douche. Both intraventricular and extraventricular galvanization may be employed. The bromides, chloral 0.2 to 0.3 gm. (3 to 5 grains) three or four times daily, and validol (6 to 8 drops every two to three hours) are indicated in the treatment of nervous nausea.

BOOK REVIEWS.

SURGICAL OPERATIONS.

By Prof. Pels-Lensden. Translated by Faxton E. Gardner, M.D. Rebman Company, Publishers.

This single volume of surgery, found and printed in the usual attractive form of the Rebman works deals comprehensively with many of the recent methods of surgery. The German authors are freely quoted, and in many instances the various authors are quoted at length where the author's individual opinions have a distinct bearing on the clarity of the subject.

Of special interest is the chapter dealing with local anesthesia, which includes the methods of Schleich, Aberst, and Hackenburck, the venous anesthesia after Bier is given in detail. Lumbar puncture is briefly discussed.

The chapter on plastic work, tendon and nerve sutures and plastic work on the bones is brief but modern.

Many of the modern features of blood vessel surgery, osteoplastic methods and recent improvements in surgery of the various organs are briefly but clearly set forth in this volume.

Whereas, no volume of surgery keeps abreast of rapidly changing surgery of the day, we feel that this single volume of surgery has epitomized recent improvements especially of German surgery in a readable and logical form.

INTERNATIONAL CLINICS.

Vol. II, 22d Series. J. B. Lippincott Company, 1912. Price, $2.00.

This quarterly contribution to the literature of medicine, surgery and the other branches of medicine, maintains the splendid standard of the International Clinics of the past.

Of special interest is there an article on "The Management of Sunstroke," by Simon Baruch, of New York.

In the Medical Section we note a splendid article on "Epidemic Poliomyelitis," by Suison Flexner.

One desiring a resume of the present day methods of anesthesia administration will find a splendid series of contributions comprising fifty-two pages of this volume, under the heading, "Symposium on Anesthesia."

The volume is profusely and beautifully illustrated.

COLLECTED PAPERS BY THE STAFF OF ST. MARY'S HOSPITAL.

Mayo Clinic, 1911. Octavo of 603 pages, Illustrated. Philadelphia and London: W. B. Saunders Company, 1912. Cloth, $5.50 net.

The 1911 edition of reprints by the staff of the Mayo Clinic is well up to the standard set by pre-

vious volumes. The articles contain an amount of most valuable information by most eminent surgeons. A wide field of surgery is dealt with, of especial interest are the papers on the diagnosis and surgery of kidney and ureteral conditions. The work is fully illustrated with most excellent radiograms, microphotographs, etc.

This series of papers have become almost indispensable to the modern surgeon.

ESSAYS ON GENITOURINARY SUBJECTS.

By J. Bayard Clark, M.D., Assistant Genitourinary Surgeon to Bellevue Hospital, Consulting Genitourinary Surgeon to the Elizabeth General Hospital, etc. William Wood & Co. New York, 1912. $1.25 net.

A very interesting little volume of 174 pages, comprising a collection of essays on genitourinary subjects. The style is easy and readable, and contains considerable valuable information. The work can hardly be considered of value as a reference or text book.

DIGESTION AND METABOLISM.

By Alonzo Englebert Taylor, M.D., Rush Professor of Physiological Chemistry, University of Pennsylvania, Philadelphia. Lea & Febiger, 1912. Pages 560.

The volume treats of digestion and metabolism in a popular manner, and is written for the physician and student rather than for the physiological chemist. The composition of foodstuffs, ferment action, digestion, metabolism of the various classes of foods, auto-intoxication, etc., are among the subjects dealt with in a clear and readable manner.

The work is good, and will repay careful study.

THE BOY.

SEX HYGIENE FOR THE MALE, AND WHAT TO SAY TO

By G. Frank Lydston, M.D., Professor of the Surgical Diseases of the Genitourinary Organs and Syphilology, Medical Department State University of Illinois, etc. The Riverton Press, Chicago, 1912.

"To the parents and teachers who sincerely wish to fight for our boys and who wish to learn what to say to them, and to the physician who wishes to lighten his labors by educating the public in matters pertaining to sex. . . ." This, the dedication of the work, rather well explains the purpose of the work and its scope. The subject is approached from a popular lay standpoint, and is free from too technichal terms and discussions.

Among subjects discussed are "Methods of Instruction of Youth," "Inspection and Regulation of the Social Evil;" "Physical Training and Health Building" as a necessary adjunct to sexual health; chapters on the anatomy, physiology and diseases of the sexual organs, etc.

Such books are timely and do not receive the attention they deserve. We welcome with enthusiasm new prophylactic measures against typhoid, meningitis, etc., and hasten to promulgate and practice them, yet with criminal negligence we neglect to teach the young the dangers of the sexual diseases and deny them that knowledge of sexual prophylaxis, of sexual diseases, of sexual malpractices which they should know. Too long has a false sense of shame in matters sexual worked but for the continued plague of venereal disease.

A TEXT-BOOK OF PRACTICAL THERAPEUTICS.

With Especial Reference to the Application of Remedial Measures to Disease and Their Employment upon a Rational Basis. By Hobart Amory Hare, M.D., B.Sc., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia, etc. Lea & Febiger: Philadelphia and New York, 1912. Fourteenth Edition, 984 pages, profusely illustrated.

The continuous demand for this work, calling forth 14 editions in 22 years, speaks well for its popularity and excellence. It is eminently a practical treatise on the application of drugs and other remedial measures to the treatment of disease.

The various standard drugs are first considered from a pharmacological standpoint; remedies, other than drugs, are fully discussed; and the therapy of different diseases are treated of under the special disease.

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DIAGNOSTIC METHODS.

Chemical, Bacteriological and Microscopical. By Ralph W. Webster, M.D., Ph.D., Assistant Professor of Pharmacological Therapeutics and Instructor in Medicine, Rush Medical College, etc. Second Edition, Revised and Enlarged with 37 colored plates and 164 other illustrations. P. Blakiston's Son & Co., 1912.

This volume of essays covers the broad field of chemical, bacteriological and microscopical diagnosis in a rather small space, and very creditably accomplishes its purpose.

The ten chapters, totaling some 682 pages, deal respectively with the Sputum; Oral, Nasal, Aural and Conjunctival Secretions; Gastric Contents; Feces; Parasites; Urine; Secretions of the Genital Organs; Blood; Transudates and Exudates; and Secretion of the Mammary Glands. Each subject is well handled, thorough and practical. The various chemical tests and reactions are well explained; the miscroscopic findings in various pathologic conditions are clearly described and handsomely illustrated.

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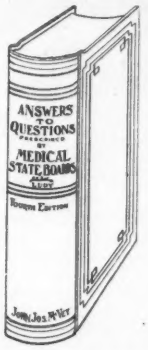

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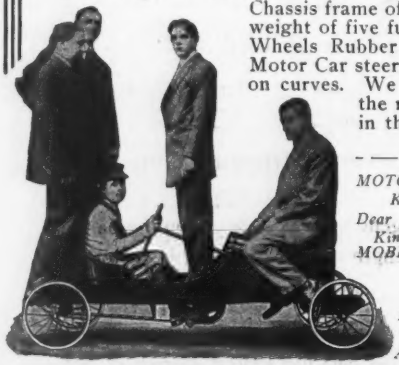

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